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A

TREATISE

ON

FEBRILE DISEASES,

INCLUDING

INTERMITTING, REMITTING, AND CONTINUED FEVERS; ERUPTIVE FEVERS; INFLAMMATIONS; HEMORRHAGIES; AND THE PROFLUVIA;

IN WHICH AN ATTEMPT IS MADE

TO PRESENT, AT ONE VIEW, WHATEVER, IN THE PRESENT STATE OF MEDICINE, IT IS REQUISITE FOR THE PHYSICIAN TO KNOW

RESPECTING THE

SYMPTOMS, CAUSES, AND CURE

OF

THOSE DISEASES.

BY

A. PHILIPS WILSON, M. D. F. R. S. Ed.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH, &c.

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ERRATA.

The reader is requested to make the following corrections with the pen.

Page
4, l. 14, dele *the* before inflammation.
12, l. 18, for *motion*, r. *motions*.
14, l. 16, for *pathological*, r. *physiological.*
23, l. 20, for *powers*, r. *power*.
26, l. 8, after health, for , r. ; and dele *that.*
39, l. 21 and 22, for *phrenetic*, r. *phrenitic.*
41, l. 6, for *more debilitated*, r. *less excited.*
44, l. 23, for *determine*, r. *inquire.*
61, l. 20, for *formed*, r. *found*.
69, l. 2, for *tend*, r. *tends*.
72, l. 19, for *parts*, r. *part*.
79, l. 9, for *in*, r. *for the separation of*.
85, The last paragraph in this page should have been in a note, the reference being at skin, l. 15.
88, l. 5, for *deep-rooted*, r. *deep-seated*.
119, l. 12, for *terminations*, r. *termination.*
120, l. 16, for *yields*, r. *yield*.
149, l. 23, for *or*, r. *and*.
174, l. 15, after power, insert ,—after instance, dele ,
176, l. 7, for *inflammation*, r. *inflammations*.
177, l. 1, 2, 3, for *till Sauvages, Linnæus, and others whom I shall hereafter have occasion to mention, made dissections*, r. *by Sauvages, Linnæus, and others, whom I shall hereafter have occasion to mention, till dissections were made*.
190, l. 10, for *fevers*, r. *fever*.
196, l. 8, for *support*, r. *produced*.
208, l. last, for *requires*, r. *impedes*.
216, l. 3, for *great*, r. *greater*.

Page
The following note was omitted in page 235, the reference is at born, l. 13. *Comparing the foregoing observations with what was said above of opium, it would appear that it is inadmissible in all cases of phrenitis while the inflammatory symptoms are at all considerable.*
238, l. 16, for *The last*, r. *Febrile Ophthalmia*.
261, l. 15 and 16, for *ophthalmia membranarum*, r. *ophthalmitis*.
275, l. 8. for *derangement*, r. *changes in the state*.
279, last line but two, before *all*, insert *nearly*.
324, l. 15, for *external*, r. *internal*; and in l. 16, for *internal*, r. *external*.
333, l. 13, before pulsus, for *et*, r. *and*; and l. 14, before febris, for *et*, r. *and*.
351, l. 13, for *attended*, r. *alternated*.
356, l. 4, for *præscribi*, r. *præscribi*.
380, l. 14, for *and*, r. *or*.
385, The reference at Mr. Steven's name should be to vol. xii, that at Mr. Collins's to vol. ii, of the Med. Comment.
390, l. 2, for *these*, r. *the*.
446, l. 18, for *remain*, r. *remains*.
452, l. 14, for *Steward*, r. *Stewart*.
453, l. 3, for *case*, r. *care*.
456, l. 3, for *acids*, r. *acid*.
484, l. 4, for *that disease*, r. *deposite this acid*.
494, l. 1, for *depose*, r. *deposite*.
499, l. 25, for *more*, r. *most*.
527, l. last. for ? r. .
533, The paragraph beginning, *Upon the whole*, and ending with, *sediment*, should have been omitted.

◆

The Engraving to face page 51.

The engraving was inadvertently executed in a stile which rendered colouring it, as was intended, impracticable. That the reader may understand the references, it is necessary to observe, that the most shaded parts represent those which should have been tinged with red.

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As it is the Author's wish to lay before the reader the experiments on which the observations made in the first volume on the Urinary Depositions in Febrile Diseases, are founded, these are given in an Appendix; to make room for which it was necessary to defer the consideration of one species of Cynanche, the Cynanche Trachealis, to the next volume.

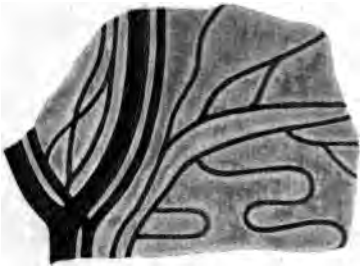


Fig: 1.

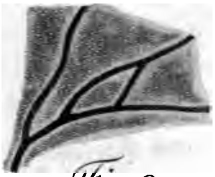


Fig: 2.

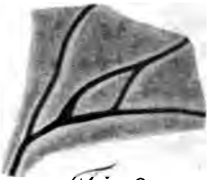
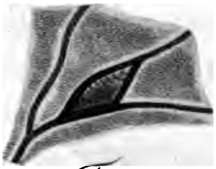


Fig: 3.



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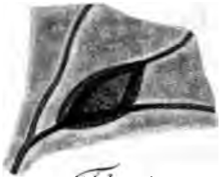

Fig: 5.

J. Roſs sculp. Wien.

A TREATISE, &c.

PART II.

OF SYMPTOMATIC FEVERS.

INTRODUCTION.

WE have now considered all those Fevers which deserve the name of Idiopathic, that is, which are not the consequence of some local affection. A local affection attends the Exanthemata, but has no share in producing the Fever, which is as truly Idiopathic as the simple Synocha or Typhus, and in the mode of practice we found it treated as such.

Among the different orders of Idiopathic Fevers, Intermitting and Remitting Fevers, Continued Fevers, and the Exanthemata, such is the resemblance that it would not perhaps be generalising too much to regard the whole as one disease, their differences rather marking varieties than species.

The remaining orders of Dr. Cullen's Pyrexiæ, namely the second, fourth, and fifth, the Phlegmasiæ, Hemorrhagiæ, and Profluvia, essentially differ from the foregoing. In these we shall find a local affection the primary complaint, and the fever so constantly proportioned to it that we can almost always judge decisively of the degree of the local affection by observing that of the febrile symptoms.

Is it surprising then that the maxims on which the treatment of these complaints is founded should differ widely from those which regulate the treatment of fevers properly so called, and the exanthemata? For *these reasons*, which I have considered more at length in the general Introduction, I divided Dr. Cullen's Pyrexiæ into two classes, abandoning the term altogether, and using instead of it, for want of simpler terms, the circumlocutions, Febres Idiopathicæ and Febres Symptomaticæ. The latter we are now to consider.

Symptomatic Fevers were defined, a primary local affection, attended with increased temperature and a frequent pulse.*

In this class are arranged three orders, the Phlegmasiæ, Hemorrhagiæ, and Profluvia.

The first of these orders was defined, Symptomatic Fevers, in which the local affection is either an external inflammation, or a fixed pain with derangement of some internal function.

Hemorrhagies were defined, Symptomatic Fevers, in which the local affection is a flow of blood not occasioned by external injury.

The definition given of the last order, the Profluvia, was, Symptomatic Fevers, in which the local affection is an increase of some colourless excretion.

But before we enter on this class of diseases, it will be necessary to make some observations on the local affections which attend them.

---

* See the general Introduction, p. 49.

1. Of the Local Affection of the Phlegmasiæ.

The local affection of the Phlegmasiæ sometimes appears without being accompanied by fever. Such cases I shall term Inflammations, in contradistinction to Phlegmasiæ.

Whatever systematic writers have done in their systems of nosology,* they have always in their systems of practice, either avowedly or not, treated of simple inflammations before they have entered on the Phlegmasiæ.

Of the Symptoms of the Inflammation.

Simple Inflammations are of two kinds, the one vulgarly termed a pimple, and the other which may be termed a stain, blotch, or efflorescence. Neither of these complaints are included in Dr. Cullen's nosology.† The former, which appears almost exclusively on the face, is different from his

---

* See general Introduction, pp. 8, 9.

† See general Introduction, p. 13.

Phlegmon (boil), which may appear on any part, and often produces fever.

In the nosology of Sauvages pimples are mentioned in the definition of the Efflorescentiæ, the second order of his first class (Vitia). He terms them Pustulæ; the definition of the order is "Tumores humorales "exigui gregales, vel cutis elevatio per "pustulas, papulas, phlyctænas, varos, similesve asperitates." After giving this definition, Sauvages begins to explain the terms employed in it, demonstrating the imperfection of his mode of arrangement, since pimples are not always symptomatic. Sagare makes them a genus. They are defined by Sauvages, "Phyma parvulum apice rup"tum."

I shall adopt the term Pustule from Sauvages, but not the definition, for reasons which will readily suggest themselves as we proceed.

With respect to the other species of inflammation, it is more difficult to find a technical name which shall be unobjectionable; this inflammation having generally been confounded with a local affection which resembles it but occasions fever.

In looking over the nosological systems of Sauvages, Linnæus, Vogelius, Sagare, Dr. M'Bride, and Dr. Cullen, we find this disease, or rather a disease resembling it, mentioned, as a genus, only by Sagare. The Bacchia of Linnæus, Encausis of Vogelius, and Psydraciæ of Sauvages, seem to include it, but not very accurately.

Sagare terms it Bacchia; it is his ninth genus, and the fourth of the order Efflorescentiæ. The following is the definition of the genus, which is as readily understood without as with that of the order. "Maculæ rubræ, vel efflorescentiæ nasi et "partium adjacentium eidem, guttatæ, plus "minus prominentes, asperæ, furfurascentes, "diuturnæ; hoc genus ambigit inter maculas et efflorescentias."

This definition does not very accurately apply to the inflammation we are speaking of, in which the surface is uniformly smooth. The inflammation here described by Sagare indeed frequently occurs, but I think it proper to overlook it for several reasons. Were we to rank as a distinct genus every cutaneous inflammation *which in any respect differs from every other,* instead of two, we might have 50 diseases of this kind; besides, our knowledge of cutaneous diseases is too imperfect to permit us to divide and subdivide them in this manner. By dividing them into two species which comprehend all the others, our intention in a nosological system is fully answered, and if the varieties of these species differ in the modes of practice suited to them, these modes of practice have not been ascertained.

It is sufficient therefore to divide inflammations properly so called, into two species, the Pustule, and, what I shall term, Erythema, for reasons given in the second vol. (pages 154 and 155.)

These species of cutaneous inflammations are distinguished in the following manner. In the one (the Pustule) there is an evident swelling rising in the shape of a cone, the apex of which is sooner or later formed into a small cavity, filled with yellow matter called pus. In the Erythema there is no swelling of this kind, although some general swelling of the part it occupies, is always more or less observable. The surface is uniformly smooth, there is no sudden elevation of the cuticle, and pus is never formed.

Of both inflammations redness is a characteristic symptom; but in the former it extends only to the little cone, and a short way around its base; in the other it is more diffuse, frequently spreading over the face and hands in a perfectly uniform manner.

They also agree in being frequently attended with some degree of pain, which in the Pustule is more obtuse and pulsatory, in the Erythema often stinging; in this respect however there is considerable variety. In both species the temperature of the part is increased.

All inflammations then (for they are all included in these, which may be looked upon as the extremes, if indeed there be any well defined inflammation between them) agree in being attended with redness, increased temperature, pain, and swelling. Whenever these occur they constitute inflammation,

flammation, and may therefore be assumed as the definition of this order, which belongs to the locales.* "Notæ vero inflam-"mationis," Celsus observes, "sunt quatuor, "Rubor et Tumor cum Calore et Dolore."

This order then is divided into two species, the Pustule and the Erythema. The former may be defined,

Inflammatio, tumore circumscripto, in fastigium elevato, sæpe in apostema abeunte.

The Erythema may be defined,

Inflammatio, rubore uniformi serpente, tumore partis sæpe vix evidente.

We should rank as varieties of these inflammations some diseases, which, for the want of such an order, Dr. Cullen arranges among the Pyrexiæ, particularly some species of Opthalmia and the Aphthæ Infantum.

Inflammation varies according to its termination, resolution, suppuration, or gangrene; according as the suppuration produces a well or ill conditioned sore, &c. but of this hereafter.

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* See general Introduction, p. 9.

Of the Causes of Inflammation.

Of the remote Causes of Inflammation.

All parts of the body, if we except a very few, the cuticle, nails, hardest parts of the teeth, and hair, are subject to inflammation.

As the seat of simple inflammation is always in the skin, to the causes affecting this organ we are to look for the causes of this complaint. Some of these I have already had occasion to mention in considering Eruptive Fevers. Some eruptions we found particularly connected with the state of the primæ viæ. Derangement of these passages may be regarded as a principal predisposing cause of simple inflammation. It is sometimes sufficient to excite it. In those who are subject to Pustules or Erythema of the face, they are often produced by indigestion.

Among the predisposing causes may also be ranked too full a diet, particularly too free an use of fermented liquors. Too scanty and poor a diet also sometimes gives the same predisposition, the same may be said of whatever debilitates, fatigue, excessive venery, &c. which act also sometimes as exciting causes. In short we shall find that there are two very opposite states of the system favourable to inflammation, a state of debility, especially if attended with plethora, and a state of increased excitement.

Such are the causes of inflammation acting on the system in general; those which act locally may be arranged under three heads.

1. Whatever increases the impetus of the blood towards the part.
2. Mechanical irritation.
3. Chemical irritation, under which are included extremes of temperature.

It is to be recollected that the effects of any temperature are not proportioned to its degree only, but to that and the difference between it and the previous temperature of the part to which it is applied; hence sudden changes of temperature are apt to excite disease. There are few causes of simple inflammation more frequent than suddenly warming the hands or feet when chilled with cold.

The causes of the Phlegmasiæ are the same with those of simple inflammation, for in these we shall find that the local affection excites fever, not because it is of a different nature from simple inflammation, but because it is more extensive, or situated in a part of greater importance and sensibility.

Of the proximate Cause of Inflammation.

Inflammation forms the principal part of so many diseases, that to determine its nature is an object of the first importance.

It was observed, when speaking of the modus operandi of emetics,* that such is the constitution of the animal body, that whatever injures it, excites motion calculated to correct or expel the offending cause. This observation we found illustrated by the operation of emetics, cathartics, &c. In such cases we can readily trace the motions excited, and the manner in which they act, but cannot trace the manner in which the offending cause excites these motions.

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* See vol. i. pp. 217, 218, &c.

An emetic excites the action of the diaphragm and abdominal muscles which is necessary for expelling it, but why it excites these muscles and not those of the limbs for example, we cannot tell. The final cause is evident, but the efficient cause is hid in the utmost obscurity.

Till we are enabled to trace the intervening events between the irritation of the stomach, and the action of the muscles employed in vomiting, our knowledge of this operation must be imperfect. And imperfect we have reason to believe it must ever remain; for although we can trace the motions excited in the larger parts of the animal machine, we cannot hope that our senses, assisted by all that art can do, will ever detect the finer motions of this wonderful structure.

What microscope will detect the changes in a nerve, while it conveys impressions or obeys the dictates of the mind? What differences can we detect in the encephalon of the most illiterate and the most learned, in those of the dullest and the brightest genius? Nay, if we except the motion of the vessels, and the difference of temperature, we can detect no difference between the living and the dead brain. How vain then is the hope of arriving at a knowledge of the more minute motions of the animal system!!

Most physiologists, in their researches concerning the animal functions, have wisely admitted that the changes which take place in the nervous system are placed beyond our view; and those who have aimed at tracing them have only shewn the futility of the attempt. In pathological enquiries, therefore, the changes which take place in the nervous system, on which sensation and motion depend, are overlooked, and we confine ourselves to tracing the phenomena which are the causes or consequences of such changes, and when we have succeeded in tracing these phenomena in any function of the system, we consider ourselves as having arrived at a knowledge of that function. The knowledge indeed is very incomplete, but it never perhaps can be less so. In this sense we say we understand the operation of vomiting, coughing, &c. and if we are right as far as we attempt to go, these operations, we have reason to believe, never can be better understood.

Now if it can be shewn that inflammation, like vomiting and coughing, is an effort of the system to remove an offending cause, and if we can trace every step of this operation with the exception of the changes induced on the nervous system, we understand the nature of inflammation as completely as that of any function of the body.

But before we enter on this part of the subject, let us take a view of the opinions which have hitherto prevailed respecting the nature of inflammation, and see how far they are well founded.

Of the opinions which have generally prevailed on this subject, four only deserve attention.

1. That which supposes a morbid lentor of the blood clogging the minute vessels.

2. That which supposes what has been

termed error loci, the grosser parts of the blood getting into vessels too small to transmit them.

3. That which supposes a spasm of the extreme vessels.

And lastly, that which attributes inflammation to a morbidly increased action of the vessels of the part; and this is the favourite hypothesis of the present day, at least with the medical men of this country.

The reader will readily perceive that the principle of the three first doctrines is the same. In all, obstruction is regarded as the proximate cause of inflammation. It is surprising therefore that none of the supporters of these hypotheses thought of trying whether or not obstruction is capable of producing inflammation. Admitting that the vessels are obstructed, it does not follow that an accumulation of blood will take place in the part; the blood may pass off by anastomosing branches, or the vessels may resist the distending force. If it be found that obstruction of the vessels may exist without producing a single symptom of inflammation, what becomes of these doctrines!!

doctrines!! The following experiment seems to determine this point.

I passed a hot wire through the web of a frog's foot, by which the skin about the hole was shrivelled, and the vessels obstructed, no fluid of any kind being discharged. Here an obstruction was produced surely more than equal to what takes place in many inflammations of small extent, and yet no symptom of inflammation followed; every part of the web appearing as pale as before the experiment.

It remains to enquire how far the opinion, of inflammation depending on a morbidly increased action of the vessels of the part, is well founded.

Whatever may be the arguments now brought in support of this hypothesis, there can be no doubt I think respecting its origin. It was an inference from the mistaken opinions which prevailed respecting the cause of animal temperature.

When physicians believed the temperature of the animal body to depend on the friction of the blood against the sides of its vessels, it was a natural inference that when the temperature of any part was increased above the usual degree, the motion of the blood in that part, the only acknowledged cause of animal temperature, was increased in the same proportion.* But the velocity of the blood cannot it is evident be partially increased, except by an increased action of the vessels of the part.†

It

---

* "A renixu, pulsu, compactu, vasorumque adhuc "meabilium angustatione a tumore obstructorum, "attritus fit ingens partium liquidi inter se, in solidum, "solidi in illas, inde calor et æstus." Aph. Boerhaavii 382.

† "The phenomena of inflammation all concur in "shewing that there is an increased impetus of the "blood in the vessels of the part affected; and as at "the same time the action of the heart is not always "evidently increased, there is reason to presume, that "the increased impetus of the blood in the particular "part is owing especially to the increased action of "the vessels of that part itself." Dr. Cullen's First Lines, par. 239th. "Inflamed vessels seem likewise to "acquire a great deal of additional strength or at least "they act with greater energy than formerly, *for the "blood is observed to circulate with far greater rapidity "through an inflamed than through an uninflamed part.*" See a paper, by Mr. Moore, on the process of nature in filling up cavities, &c. which obtained the prize-medal given by the Lyceum Medicum Londinense for 1789.

It required no nice experiments however to discover, that the circulation is as rapid in many of the cold, as in some of the warm, blooded animals, and consequently, that the received doctrine of animal temperature was erroneous.

With this doctrine the hypothesis, which was founded on it, should have been abandoned.

But admitting that animal temperature depends on the motion of the blood, does the blood move with increased velocity in an inflamed part? Whether it does or not, the supporters of the hypothesis before us have not thought it worth while to enquire. What if the blood is found to move more slowly in an inflamed than in a sound part!

It will hardly be believed that the increased redness of the part has been adduced as an argument in favour of the same hypothesis; for admitting that the increased redness, which can only depend on an in-

---

Is it not surprising that physicians should have so decidedly made up their opinion respecting the state of the circulation in an inflamed part, when it is certain, that none had been at the trouble to examine it!!!

creased quantity of blood in the vessels, (for all admit that in inflammation there is not necessarily any extravasation of red blood); admitting, I say, that the increased redness depends on an increased action of the vessels, it would baffle the most acute to shew how it could possibly be; how a more vigorous contraction of the vessels can enable them to receive a greater quantity of blood.

I need hardly remind the reader of what is generally admitted respecting the structure of the blood-vessels, and the manner in which they assist the heart in supporting the circulation.

Every systole of the heart distends those arteries into which it immediately propels the blood. But the artery is furnished with an elastic coat which resists this pressure, and which, immediately after the impulse which distends it ceases, begins to resume its former dimensions, contracting the diameter of the artery, and thus pressing the blood on in that direction where the least obstacle is opposed to its passage, that is, forwards, the valvular structure of the arteries where they leave the heart preventing its return to this organ.

But we are acquainted with no body so perfectly elastic as to return to its former dimensions with a force equal to that which compressed or distended it. If then there be no power inherent in the arteries by which the blood may be propelled, but a degree of elasticity, the impetus given by the heart must not only be sufficient to overcome friction and other causes impeding the circulation in every part of the body, but also to admit of considerable diminution from the loss it suffers in distending the blood vessels.

It would be improper here to enter on the various arguments which render the opinion of the circulation depending on the action of the heart alone, inadmissible; nor is it necessary, since this opinion I believe is universally abandoned. The vessels, then, are endowed with a power different from mere elasticity, and there are a sufficient number of observations to leave no room to doubt, that this power differs only in degree from that of the heart, that is, is a muscular power.

Such are the powers of the blood-vessels; let us consider how an increased exertion of these powers, what has been called a morbidly increased action of the vessels, in any part, can there occasion a morbid accumulation of blood.

When we speak of a morbidly increased action of vessels, do we allude to the state of their muscular coat? If the muscular fibres of the blood-vessels run transversely,* what must be the effect of unusual contraction? An unusual diminution of their area. Do we mean by morbidly increased action, an increase of elasticity; the consequence of this can only be a greater tendency in the vessel to preserve its mean area.

After each contraction of the muscular coat, the elastic acts as its antagonist till the vessel arrives at the mean degree of dilatation; but after this there is no farther power of distension inherent in the vessel.

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* See the Observations and Experiments of Haller and others.

The action of the elastic coat ceases, and it is needless to observe, that a muscular fibre has no power to distend itself.

The only power by which the vessel can be farther distended is the vis a tergo; after the vessel arrives at its mean degree of dilatation, both the elastic and muscular coats act as antagonists to the vis a tergo,* to the force propelling the blood into, and thus tending farther to dilate, the vessel. If then the vis a tergo becomes greater than in health, the powers of resistance inherent in the vessels remaining the same, or if the latter be weakened, the vis a tergo remaining the same, the vessel must suffer a morbid degree of dilatation. There appear to be no other circumstances under which a vessel can suffer such dilatation.

The opposite of this state is, when the powers of the vessels remaining the same, the vis a tergo is diminished; or the vis a tergo remaining the same, the power of the vessels is increased, and this opposite condition produces an opposite state of the vessels, a preternatural diminution of their area.

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* The more vigorous the muscular coat, the more readily it is thrown into action by the distending power, and the more powerfully it acts.

In the one case, the distending bears too great a proportion to the resisting force; and preternatural distension is the consequence. In the other, the resisting bears too great a proportion to the distending force; and preternatural contraction is the consequence.

But it is said that an increase of the resisting force, that is, an increased action of the vessels in any part, occasions increased redness. Increased redness can only be the effect of an increased quantity of blood in the part. That the quantity of blood in any part may be increased, either the area of its vessels must be increased, or blood must be extravasated.

Let us for a little advert to the only attempt to reconcile the phenomena of inflammation to the popular doctrine which, as far as I know, has been offered to the public, namely, that by Dr. Fowler of Salisbury,

lisbury,[*] in his inaugural dissertation, published at Edinburgh in 1793, entitled "Quædam de Inflammatione."

Dr. Fowler's attention had for some time been turned to the subject of inflammation, and his attempt is perhaps as good a one as the nature of the case admits of; how far it is succeessful the reader may judge.

In defending his own opinion, Dr. Fowler is led to combat that proposed about the year 1790 by Dr. Lubbock and Mr. Allen;[*]

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[*] Previously well known to the medical world by his Essay on Galvanism.

[†] It has been asserted, that the opinion here alluded to is of much older date; and that imperfect traces of it are to be found in the works of various writers cannot be denied, but their observations in one passage contradict those in another, so that Dr. Lubbock and Mr. Allen have the merit of having first advanced the opinion in a connected form, and of having separated it from the remains of the old hypothesis. Neither of these gentlemen have, as far as I know, published any thing on the subject, nor made experiments to ascertain the truth of their opinion. With the particular sentiments of Dr. Lubbock on the subject I am unacquainted. In the Medical Society of Edinburgh I have often heard Mr. Allen, with much perspicuity, defend his opinion of the proximate cause of inflammation,

but in stating this opinion, "arterias inflam-"matas, quam in statu sano debiliores "esse," he commits an inaccuracy which runs through many parts of his reasoning.

According to the late theory of inflammation, it is not necessary that the vessels should be in a state of greater debility than in health, that their action may be more powerful; it is only maintained that the proportion which their action bears to the vis a tergo is less than in health. The vis a tergo remaining the same, the vessels before inflammation can take place according to this doctrine, must be in a state of debility; but if the vis a tergo is increased, as in Synocha, inflammation may take place although the vessels of the part act as powerfully as in health or more so. But after the inflammation has taken place, as they

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tion, resting his defence on this ground alone, that it is the only hypothesis on which we can explain the increased redness of an inflamed part. It will appear, as far as I can judge, from the experiments I am about to relate, that we may go farther, that it is the only doctrine of inflammation by which we can in a satisfactory manner explain any of its phenomena.

are supposed to be preternaturally distended, we must suppose them debilitated. To take Dr. Fowler's observations in the order in which he gives them.

"Ii, quibus altera opinio maxime placet, "contendunt, auctam actionem arteriarum "partis inflammatæ demonstrari calore immodico, qui nunquam nisi ex cursu sanguinis incitatiori nascitur,"* &c. "Calet "præter modum, quia (ut omnia quæ exhibet "animal, phenomena demonstrant) caloris "evolutio fere semper in ratione est arteriarum actionis."†

To what phenomena does Dr. Fowler allude? It is true that the temperature of the animal is increased when the circulation becomes more rapid, in consequence of exercise for example, so that the blood is sent more frequently through the lungs; but where are the phenomena which prove that an increased action of the vessels of any part, increases the temperature of that part? The only case to which Dr. Fowler can allude is that of inflammation, for in no other is there a local increase of temperature, so that he is here begging the question, the very subject of dispute is whether or not the vessels of an inflamed part are in a state of increased action.

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* Page 9. † Page 24.

I may refer to the observations and experiments of Dr. Crawford, Lavoisier, Girtanner, Hassenfratz, and almost every other late writer on the subject, to prove that arterial blood is converted into venous; that is, has its capacity for caloric lessened, even while it stagnates, and, we have reason to believe, as readily as when it is moved with its greatest velocity. The rapidity with which it evolves caloric, not depending on the velocity of its motion, but on its degree of oxygenation. There is not therefore a shadow of reason for supposing that an increased action of vessels which is merely local, must occasion an increased evolution of caloric.

In another place* Dr. Fowler again begs the question by adducing the increased pulsation in an inflamed part as an argument for his opinion.

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* Page 18.

Dr. Fowler is at much pains to prove what, as far as I know, has not been questioned, that when the arterial trunks supplying any part are debilitated, no inflammation ensues,* *h.e.* that when the vis a tergo is destroyed or nearly so, (for let it be recollected that in the capillary, not in the larger arteries, we are to look for the proximate cause of inflammation, as will presently more fully appear) inflammation is not the consequence. Nor can it possibly be according to the hypothesis of Dr. Lubbock and Mr. Allen. How can the action of the vessels bear too small a proportion to the vis a tergo where no vis a tergo exists, or where the diminished action of the capillaries is owing chiefly, or in great part, to the diminished vis a tergo. The hypothesis which Dr. Fowler here opposes, therefore, is one of his own creation. In speaking of that he means to oppose, he constantly keeps in view his erroneous statement of it. If I understand the doctrine in question, it supposes all the larger arteries of an inflamed part in a state of increased action.

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* Pp. 11, 12, 22.

As no account of this doctrine has been published by its authors, there is no work to appeal to for their opinions; I can only observe therefore, that the view of the doctrine I here give is, I believe, the same which is taken of it by Dr. Lubbock and Mr. Allen: but whether it is so, or not, it is that which we are about to consider, and consequently Dr. Fowler's observations are of consequence at present only as far as they affect this view of it.

Whether Dr. Fowler or I take an erroneous view of Dr. Lubbock and Mr. Allen's opinions, they only can determine. But whether the doctrine of the proximate cause of inflammation, such as I state it, is just, (the only point in which the public is interested) must be determined by an appeal to facts.

Against this view of the doctrine then, it is evident that the following observations of Dr. Fowler are of no weight. "Sed "præcipue a sensu pulsationis in parte, quo "certe indicatur, differentiam contractiones "inter et dilatationes arteriarum (ex qua "pulsus percipitur) majorem esse in inflammatis

"matis quam in sanis arteriis."* "Nemo "sanus negabit arterias, tonsillarum in "cynanche maligna; artuum in rheuma-"tismo chronico; scroti in hydrocele; ure-"thræ post gonorrhœam multo debiliores "esse, quam in cynanche inflammatoria; "in rheumatismo acuto; in inflammatione "terticulorum; vel denique ineunte go-"norrhœa: non tamen in illis sed in his ex-"emplis tumor et maximus reperitur, et "vasa sanguinea turgidiora."† Since the degree of the inflammation is not proportioned to the debility of the vessels of an inflamed part, but to the diminished proportion of their power to the vis a tergo, the greater the vis a tergo, ceteris paribus, the more considerable must be the phenomena of inflammation. It is not difficult to explain therefore why the swelling and other phenomena of inflammation are more considerable in the latter, than in the former, cases.

With respect to the argument drawn from inflammation seeming sometimes to

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[*] Page 9. [†] Pages 12 and 13.

restore the vigour of debilitated parts,* it may be observed, in the first place, that the hypothesis Dr. Fowler combats, supposes that the larger arteries of an inflamed part are in a state of increased action; but this is not a fair argument in favour of either opinion, as we can by no means explain in what way inflammation acts in such cases. It cannot be by directly restoring the vigour of the blood-vessels, because we know that inflammation, even in a part previously sound, leaves the vessels debilitated.

In an inflamed part the capillary arteries are in a state of debility, the larger in that of increased excitement.† The difference between what is called active and passive inflammation depends on the degree in which the larger arteries are excited; and, we have reason to believe, that in the cure of inflammation by resolution, in proportion as the debilitated capillaries are excited to action, the action of the larger arteries abates, and the inflammation is cured as soon as the proper equilibrium is restored between the larger arteries and the capillaries, although the vessels of the part are upon the whole in a state of greater debility than previous to the attack of the disease.

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* Page 13.

† See the experiments and observations hereafter related.

And that such is the case will appear probable, among a variety of more direct observations, from this consideration alone, that when the inflammation is of such importance and extent that the increased action of the larger vessels extends to the heart, so that the inflammation is attended with general increased action of the vascular system, that is, with Synocha, we observe that, as the inflammation yields, the general excitement subsides, and that when the inflammation is removed, the whole system is left in a state of greater debility than before the disease.

In short, inflammation seems to consist in the debility of the capillaries followed by an increased action of the larger vessels, and is terminated as soon as the capillaries are so far excited, and the larger arteries so far weakened by their excessive action, that the force of the capillaries is in due proportion to the vis a tergo.

This doctrine we shall find supported by direct experiment, and at once capable of accounting for all the phenomena and causes of inflammation, and explaining in the most satisfactory manner the remedies which relieve it whether attended with fever or not; nay, suggesting improvements in the mode of treating the phlegmasiæ, which we have reason to believe may be of some importance.

According to this opinion, it will perhaps be said, the vessels of a part may be debilitated, and yet no inflammation take place!! Is this what has been termed the new doctrine of inflammation? I believe it is; but whether it is or not, it is that which, as far as I am capable of judging, is an unavoidable inference from a very simple set of experiments and observations.

But Dr. Fowler endeavours to support the popular hypothesis by experiments, as well as inferences from the phenomena of inflammation. Let us see how far this part of the attempt is successful.

He quotes an experiment of Verschuir to prove, that although inflamed vessels are contracted in some parts, they suffer a proportional dilatation in others. But Verschuir's experiment was made on a large vessel, whereas the proximate cause of inflammation must exist in the capillaries, in which it is evident, with the assistance of the microscope, that inflammation begins; besides, we shall presently find that an inflamed vessel never assumes the appearance described by Verschuir.

"Major nempe, aut minor portio sangui-"nis projicietur in partes dilatatas arteriæ, "prout major minorve portio sit, quæ e "partibus contractis extrudatur."* This mode of reasoning would be just, were the vessels tubes closed at both ends; but what prevents the blood, which is extruded from the contracted parts of the vessels, from moving forward, as we shall find from direct experiment it does, when the vessel acts with increased, as when it acts with its usual, force? The only difference is, that in the former case the blood moves with greater velocity. What detains it to occasion a preternatural dilatation of any part of the vessel? To account for such a state of the vessels, we must have recourse to the doctrine of obstruction, which we shall find doubly refuted, by the experiment already related, and the experiments which support the doctrine which we are about to consider.

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* Page 15.

Dr. Fowler irritated the ear of a rabbit by gently rubbing it; it became red, but soon resumed its natural colour; the irritation was repeated with the same effect more than ten times in a quarter of an hour. "Vim contractilem arteriarum," he observes, "minime exhaustam fuisse frictione, "ut nonnulli volunt: nam si fuisset, om"nino improbabile est, eamdem (admoto "iterum stimulo) tam cito et frequenter "potuisse redintegrari." I need hardly observe, that any conclusion from this experiment is begging the question. Has Dr. Fowler determined how long a time is necessary in such circumstances for restoring the excitability; but it would have been of no consequence if he had, his conclusion would still on several accounts have been exceptionable. He still keeps his, as it appears to me, erroneous definition in view, and forgets that inflammation may be excited in any part by stimulating the larger vessels, the capillaries remaining in statu quo.

Besides, he overlooks a fact well known, and which must strike every one, in making even coarse experiments on the circulation, that the farther the vessels are removed from the heart, the more readily they are debilitated. I have known a degree of friction, which would produce no sensible effect on a vessel of the 20th or 30th part of an inch in diameter, instantly produce such a degree of debility in the capillaries, that in the space of a few seconds they were distended by the vis a tergo to two or three times their former diameters. Might not the friction in the foregoing experiment then, while it excited the larger arteries, debilitate the capillaries? Nay, the very circumstance of exciting the larger arteries is sufficient to debilitate, by overdistending, the capillaries; but, as soon as the friction was removed, the preternatural excitement of the large arteries ceasing, the capillaries regained their vigour. This account of the phenomena we shall find consistent with every thing which seems ascertained respecting the nature of inflammation. But only granting that it is possible to explain the phenomena in this way, Dr. Fowler's inference from his experiment, it is evident, is invalidated.

With regard to Dr. Fowler's experiment in which the trunk of an artery in a rabbit's ear was laid bare, it is only necessary to observe, as of the experiment he quotes from Verschuir, that it has no relation to the point in question, the proximate cause of inflammation having its seat in the capillaries, and it being admitted on all sides that the larger vessels of the part are in a state of increased action.

When the larger arteries are debilitated, and consequently distended, the complaint, which has been termed turgescence or partial plethora, is of a nature quite different from inflammation. In this case there is little or no accumulation of blood in the capillaries, as appears from their being pale or only slightly turgid, the vis a tergo from the debilitated state of the large vessels being too weak to distend them, although we have every reason to believe that they partake of the debility of the part; but that debility not being increased by preternatural distension, as here happens in the large vessels and in the capillaries of an inflamed part, they preserve the circulation, so that the state of turgescence and inflammation are exactly opposite. In the one case, the action of the capillaries is weak, compared with that of the larger vessels; in the other, the action of the larger vessels, compared with that of the capillaries. The justness of this distinction will, I think, appear more fully as we proceed in considering the nature of inflammation. On the difference of these states depends all the difference between the cold apoplectic, and the furious phrenetic.

Dr. Fowler's experiment on the large artery of the rabbit's ear was unnecessary;*

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* Pp. 20, 21.

a limb covered with varicose veins would have answered his purpose equally well; there the vessels are evidently much debilitated, and yet there are no symptoms of inflammation. Nor need he have made that with opium on the ears of six rabbits; he might have found many a paralitic limb from which he might with equal accuracy have drawn his conclusion, "Distensionem "partis alicujus arteriæ non ex debilitate "tunicæ ejusdem muscularis provenire (quo-"niam quo magis debilitata eo minus dis-"tenta fuit arteria): sed ex contractionum "vigore et frequentia."* Or he might have found the vessels in the last stage of hemorrhagy in precisely the same state with those of the rabbits ears. In short, his experiment proves what I believe has not been questioned, that in proportion as the vis a tergo is lessened, the vessels are less distended.

I shall quote but one more passage from Dr. Fowler's Treatise. Of the colour of an inflamed part, he observes, "Rubet etiam

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* Pp. 22, 23.

"fortasse, quia plus sanguinis in venas pro-"pellitur, quam ab eis facile potest reduci; "actione earum non pari ratione, ac arteri-"arum adaucta."* By what experiments has Dr. Fowler discovered that the veins of an inflamed part are more debilitated than the arteries? But the phenomena of inflammation having forced him into this assertion, he admits almost all that his opponents contend for; if the veins are in a state of preternatural distension, they must be in a state of debility; but he says the arteries are in a state of increased action! What nice line of distinction has Dr. Fowler discovered between a capillary artery and the vein in which it terminates!!† He adds besides,

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* Page 23.

† If the reader will take the trouble to view, through the microscope by transmitted light, the edge of a fish's fin, he will see the red capillary arteries running into their corresponding veins, and forming with them small arches, arranged with much regularity, in which, from the degree to which it is necessary to magnify the part, the globules of the blood seem to move with astonishing velocity, presenting an appearance striking and beautiful beyond, perhaps, any other which the microscope affords.

"Valde porro probabile videtur ruborem, "magna saltem ex parte, deberi vasis lym-"phaticis sanguine jam turgidis."* Are not the colourless† a principal part of the capillary arteries? Can they admit the red particles without being preternaturally distended? Can a state of preternatural distension exist without debility?

But why did not Dr. Fowler at once determine the point in dispute, by observing an inflamed part through the microscope? This is surely the most decisive and simple experiment. Had he thus determined that the blood is moved with increased velocity in an inflamed part, there would no longer have been a shadow of doubt respecting the increased action of the vessels in inflammation.

I shall not anticipate what I am about to say in support of the new theory of inflammation; the prevalent opinion will be sufficiently refuted by the following experiment alone.

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* Page 23.

† I translate lymphaticis, colourless, because Dr. Fowler cannot surely suppose that, in inflammation without extravasation, the blood gets into the lymphatics properly so called.

All that is necessary in order to determine whether inflammation consists in an increased action of the vessels, is to induce such an action, and observe whether inflammation is the consequence. Having adapted the web of a frog's foot to a microscope, I now and then observed the velocity of the circulation for some minutes, which during this time continued, as far as I could judge, the same. I then wetted the foot with distilled spirits, and in a few seconds observed the blood in all the vessels of the web moved with a wonderfully increased velocity, which, as I constantly kept the web moist with spirits, continued as long as I observed it, ten minutes or a quarter of an hour. But during no part of the time could I perceive the slightest symptom of inflammation, either with or without the microscope. The vessels, instead of appearing redder and more turgid, were evidently paler and smaller than before the application of the spirits. I still farther increased the velocity of the circulation in the web by throwing on it the concentrated rays of the sun from the speculum of the microscope, and still with the same effect.

An excessive application of these agents would unquestionably have deprived the vessels of their excitability, and then the phenomena must have been different. It is well known however, that the excitability of amphibious animals is exhausted with difficulty. The heart of a frog will beat many hours after it is removed from the body. I therefore failed to destroy the excitability of its vessels by any means I employed in this experiment. We shall presently see what are the effects of impaired excitability of the capillary vessels.

Is it not a fair inference from all that has been said, that the opinions hitherto maintained respecting the nature of inflammation, namely, those attributing it to obstructing lentor, error loci, spasm, and increased action of all the vessels of the part, are false? Let us now determine how far the opinion of Dr. Lubbock and Mr. Allen, which I have already had occasion to explain at sufficient length, is well founded.

If it is proved to be well founded, all the foregoing opinions are doubly refuted; and with respect to the last of these, as it has been shewn that where increased action of all the vessels of a part is present, inflammation is not, if it can be shewn that where inflammation is present, increased action of all the vessels is not, there will not surely remain the shadow of an argument to support it.

It is no difficult matter to determine the state of the circulation in an inflamed part. An inflammation had been excited, I do not know how, in the web of a frog's foot; having applied it to the microscope, I found the vessels of the part greatly dilated, and the motion of the blood extremely languid. In several places, where the inflammation was greatest, it had ceased altogether. It was at once evident, on observing the part through the microscope, that where the inflammation was greatest the vessels were most dilated, and the motion of the blood was slowest. Nor did I, in one instance, observe the alternate contractions and dilatations supposed by Dr. Fowler to be the very essence of inflammation.

The distension of the vessels, which in the healthy state admit only the colourless parts of the blood, was apparent, for in the inflamed parts a much greater number of vessels admitted the red particles than in the sound, and the interstices of the red vessels appeared more opake, probably from the enlargement of innumerable small vessels, still too small to admit the grosser parts of the blood.

While I was viewing the inflamed web it occurred, that if I could succeed in stimulating its vessels to action, and thus remove the inflammation, which by this time I was thoroughly convinced depended on their debility, this would be an additional proof of the doctrine before us.

With this view I wetted the inflamed web with distilled spirits, at the same time throwing upon it the concentrated rays of the sun from the speculum of the microscope. The blood, in all the vessels except in those of the most inflamed part, began to move with greater velocity; and in proportion

portion as this took place, the diameters of the vessels were diminished, and the redness became evidently less remarkable, the web seemed paler, and the interstices of the vessels became less opake.

In the most inflamed part however the blood was still stagnant. After I had despaired of restoring action to the vessels of this part, I saw the blood begin to move slowly in a vessel which ran directly through the middle of it. It soon acquired a considerable velocity, and on taking a superficial view of the part through the microscope, the course of this vessel appeared like a streak of a lighter colour through the middle of the red inflamed part.

This experiment appeared decisive. As I had not however observed the inflammation from its commencement, I repeated the experiment, with the assistance of the Rev. Mr. Beraston, on a small fish (the lampern).

We found that continued exposure to the air produces a degree of inflammation, evident to the naked eye, in the fins and tail of this fish. On viewing the former through the microscope, we observed the circulation become more languid, and the vessels enlarge as the inflammation came on. The motion of the blood in the most inflamed vessels at length ceased altogether.

By gentle friction and applying distilled spirits, we repeatedly succeeded in accelerating and even renewing the motion of the blood, and in proportion to the velocity of the circulation, the vessels became evidently paler, the deeper red returning as the circulation again became more languid.

On roughly irritating a part where there was no inflammation, the part being pale and the circulation rapid, the motion of the blood was for a second or two wholly interrupted, (Mr. Boraston observed the part while I irritated it) the force I used having compressed the vessels. The vis a tergo however soon forced the blood into them, and this experiment having been repeated several times, both Mr. Boraston, and myself saw the now debilitated vessels of the parts which had been irritated, gradually dilated by the blood propelled into them, till the vessels having acquired many times their former dimensions, the part appeared highly inflamed. The motion of the blood at the same time became extremely languid, and in the most distended vessels ceased altogether. Some, even of these last, we succeeded in exciting to action, and in proportion as the motion of the blood was accelerated, the vessels became paler, the inflammation being evidently diminished. In these experiments there was no extravasation of blood, except in one instance in which the vessels were so roughly irritated as to wound some of them.

The foregoing experiments having been made on cold blooded animals, to obviate any objection which might hence arise, it was neceſsary to repeat them on an animal of warm blood.

The ear of a very young white rabbit seemed from its transparency the most proper subject for such experiments. It was accordingly submitted to the microscope, with every advantage of light that could possibly be obtained, but the endeavours, both of Mr. Boraston and myself, to distinguish the circulation with sufficient accuracy, were fruitless. The only alternative therefore which remained was an experiment of a very unpleasant nature.

I made a small opening through the skin and muscles of the abdomen, through which, by the struggles of the animal, a portion of the intestines and mesentery were soon protruded. I then brought part of the latter within the field of the microscope, and gently irritated it with the point of a pair of forceps, while Mr. Boraston, who has been much accustomed to the use of the microscope, and to delineate the objects it presented, observed the effects; the account of which I give in his own words, with engravings from the drawings he was so kind as to favour me with, representing the different stages of inflammation from its commencement to its height. That the reader may be assured Mr. Boraston's account is wholly unbiassed, it is proper to observe, that till after he described to me what he had observed in this experiment, he was unacquainted with the object I had in view in making it.

" The large arteries and veins were too " opake to admit of my distinguishing the " motion of the blood, but in the small vessels, which were more transparent, the " circulation was easily observable, and I " perceived the globules of the blood " moving along with great rapidity, but " not in sufficient quantity to give a red " colour to the vessels. The appearance of " a small portion of the mesentery on its " first examination, is given at fig. 1.

" After a few minutes exposure to the " air, the vessels became visibly enlarged, " and in some parts assumed a reddish colour, while the velocity of the blood was " proportionably diminished.

" As soon as a part of the mesentery, " which lay within the field of observation " and appeared almost colourless, was irritated with the point of a small pair of forceps, a red spot appeared, as in fig. 2. In a " few seconds it increased in size, the adjacent parts of the vessels were distended, " and, the current of blood becoming less rapid, was for some distance slightly tinged " with a red colour, as represented in fig. 3.

"This enlargement of the vessels gradually extended till the part presented the appearance of fig. 4. The circulation was at this time extremely languid, and at length was not discoverable at all. When, in this last stage, the motion of the blood was entirely stopped, a reddish shade was seen to have diffused itself over those parts of the membrane contiguous to the inflamed vessels: see fig. 5."

The reddish shade here mentioned, between the interstices of the vessels, was evidently owing to the irritation and distension having produced a slight rupture of some of the vessels, by which a small quantity of blood escaped.

It appears then, from the foregoing experiments, that the state of the capillaries in an inflamed part is that of preternatural distension and debility. That of the larger vessels may be determined without the aid of the microscope. Unassisted by glasses we readily perceive that they do not suffer a similar distension, and their increased pulsation sufficiently evinces their increased action. Nor is this increase of action so obscure as to be observed with difficulty; I have often, in inflammatory affections of the jaw, applied the finger to the external maxillary artery, both where it passes over the bone, and after it assumes the name of labialis, and in rheumatic affections of the head to the temporal arteries, and perceived them beating with unusual force. I have frequently had occasion to mention an unusually strong action of the temporal arteries as a symptom of inflammation of the encephalon. The reader will find a variety of authors observing, that an unusually strong beating in the arteries supplying any part of the body indicates that inflammation, if not present, is about to begin in that part.

Such then appears from direct experiment to be the state of the vessels in an inflamed part, the capillaries distended and debilitated, the larger arteries excited to increased action. This being determined, we find no difficulty in explaining the phenomena of inflammation, the modus operandi of its causes, and of the means which relieve it.

In the first place, of the ratio symptomatum of inflammation.

The symptoms essential to inflammation, we have seen, are redness, swelling, increased temperature, and pain.

How difficult it is to account for the increased redness of an inflamed part by the popular doctrine, we have just seen; or rather, (for what has been said amounts to as much) that were there no other fact to combat that hypothesis, this symptom alone is sufficient to invalidate it. With regard to the late doctrine of inflammation, on the contrary, increased redness of an inflamed part is a consequence too evident to require any comment.

We shall also see why the redness is of the florid kind, and assumes a purplish hue, where there is a tendency to gangrene; but of this presently.

To account for the swelling of an inflamed part by the commonly received hypothesis, it is asserted that inflammation is always accompanied by effusion into the cellular substance, for it is impossible even to conceive how a more vigorous action

tion of the vessels can occasion their general dilatation. Of this mode of explaining the swelling, it may, in the first place, be observed, that it has never been shewn that any degree of effusion necessarily attends inflammation; but admitting that it does, the swelling should be white as in anasarca, not red, for we most certainly know that there is no effusion of red blood. Besides, on examining an inflamed part through the microscope by transmitted light, it is at once evident that its increased size is, at least in great part, occasioned by vessels turgid with red blood.

Nay, on the common hypothesis, it is even difficult, as Dr. Fowler confesses,* to account for the pain of an inflamed part, which is doubtless the consequence of the preternatural distension of the capillaries, and which is often pulsatory corresponding with the pulsation of the larger arteries which, being in a state of increased excitement, tend at every contraction farther to dilate the capillaries, the sensibility of which is increased by the unusual accumulation of arterious blood, for the whole blood of an inflamed part, we shall find, in what is called active inflammation, is arterious. The pain remits in proportion as the blood becomes venous, which only happens in proportion as a tendency to gangrene supervenes.

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* P. 24.

The increased temperature we shall find no less a consequence of the debility of the capillaries. This symptom which we have reason to believe first suggested the popular hypothesis, now that the former erroneous opinions respecting the cause of animal temperature are refuted, is wholly inexplicable upon that hypothesis.

To prove that this symptom is as strong an argument in favour of the *late* doctrine of inflammation as any of the others, it is only necessary to refer to the chemical discoveries respecting the cause of animal temperature. To those who are acquainted with these discoveries it is almost superfluous to point out why debility of the vessels of any part, and consequent accumulation of blood in it, is attended with increased temperature. The motion of the blood, so far from being the cause of animal temperature, does not even seem to promote the evolution of caloric from the blood, which takes place as readily, the blood being arterial, when it stagnates in its vessels, as when propelled through them with its greatest velocity.

It therefore follows that, where there is an accumulation of arterial blood, there must also be an increase of temperature.

It may be urged as an objection to this, and at first sight it appears a considerable objection, that if the velocity of the blood in an inflamed part be much diminished, it will not sufficiently undergo the change necessary for the evolution of caloric, since it is not sent through the lungs so frequently as the blood supplying parts where the circulation is more rapid; and if the inflammation be an internal one, we cannot suppose the blood to undergo this change in consequence of any process taking place on the surface.* But it appears from a variety of observations, that although the temperature of an inflamed part is increased, any portion of its blood must evolve less caloric than the same quantity of blood in a healthy part.

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* It has been found by experiment that the blood undergoes

The experiments of Dr. Crawford, Dr. Fordyce, Mr. Hunter, and others, prove that in proportion as the temperature is increased, the evolution of caloric from the blood is diminished; and, that when the temperature is raised but a very little higher than the natural degree, it ceases altogether. Whatever therefore be the accumulation of blood in any part, no more caloric can be evolved than is sufficient to raise the temperature to this degree. Hence it is, that although in an inflamed part a greater quantity than usual of caloric is evolved, yet each portion of blood evolves less than in a sound part. The temperature to which an accumulation of blood in the part is capable of raising it being limited, it is evident, that the greater the accumulation of blood, the less caloric will be evolved from each portion of it.

undergoes the same change, though in a less degree, on the surface of the body as in the lungs.

It is farther to be observed, that although the blood continues to evolve caloric till it arrives at this temperature, yet each portion constantly evolves less, the nearer it approaches to it.* To place what is here said in a clearer point of view, suppose that a quantity of blood as 49, evolves a quantity of caloric capable of raising the temperature of the part to 98°, and suppose 100° the highest temperature in which blood evolves caloric, then if this part, instead of being supplied with a quantity of blood as 49, be supplied with a quantity as 50, the temperature of the part will not be increased to 100°, which ought to be the case, making allowance for the increased size of the part, if each portion of blood evolved the same quantity of caloric as when the temperature was at 98°. But the temperature of the part being increased we shall suppose to 98° 30′, each portion evolves less caloric. Then suppose a quantity of blood as 60, supplied, and that this quantity evolves caloric sufficient to raise the temperature to 100°, it is then evident that, although the temperature of the part is raised, yet each portion of the blood evolves less caloric than when the temperature was 98° 30′. It is also evident, that after the temperature is increased to 100°, that is, as high as it can be raised by the blood, the only effect of every fresh portion of blood accumulated in the part will be to diminish the quantity of caloric supplied by every other, by supplying part of that which raises the temperature to 100.

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* See the experiments of Dr. Crawford, by which he shews that the higher the temperature in which the animal is placed, the less caloric is evolved from the blood.

From all which it is evident, that the greater the quantity of blood accumulated in any part, the less is the waste of that principle, whatever it be, by means of which caloric is evolved, and therefore that, if it receives a much less supply of this principle, it also requires a much less supply of it. The waste of this principle in the whole inflamed part is greater than it was when the part was sound; but the waste of it in any particular portion of its blood is less. But it is only in proportion to the waste of this principle, that the blood assumes the venous colour; hence the florid appearance of an inflamed part.

It appears from some experiments of Mr. Hunter on the temperature of inflamed parts, that it is much lower than, from what we perceive by the sense of touch in external inflammations, we should be inclined to suppose. Mr. Hunter found that it did not at any time exceed the temperature at the heart, so that, according to these experiments, inflammation did not produce a greater evolution of caloric than is capable of raising parts at some distance from this organ, but not immediately exposed to the influence of the air, about one degree. He made his experiments on various animals, the temperature of whose blood at the heart was various, and declares he constantly formed the result as here stated. According to these experiments then, the additional caloric evolved in an inflamed part is only one in 97 or 98. Now if we suppose the quantity of blood in an inflamed part only double of that in the sound part, (and I have no hesitation in saying, from what I have observed with the assistance of the microscope, that it is often at least ten times as much) the waste of that principle by which the blood evolves caloric must be diminished about one half, allowance being made for the increased size of the part; or so nearly one half, that the difference may be overlooked.

It seems probable however, that Mr. Hunter's experiments were not quite accurate, we know that the blood is capable of evolving caloric at rather a higher temperature than that stated by him; but this allowed, the above statement is nearly accurate, the blood certainly ceasing to evolve caloric at a temperature a very few degrees higher.

Admitting that the temperature may be raised four degrees, the statement will then be thus; a quantity of blood as 1, gives 98; as 2, gives 102. In the latter instance the same quantity of blood supplies little more than half the quantity of caloric, that is allowing for the increased size of the part.

But the quantity of blood in the inflamed part is at least ten times that in the sound part. Then supposing the size of the part doubled, which is surely as much as it is in most inflammations, we shall have the following proportions.

The quantity of blood increased as	10
The size of the part increased as	2
The proportional quantity of blood therefore increased as	5

Thus we have a quantity of blood as 1, giving a quantity of caloric capable of raising the part to 98°; and a quantity of blood as 5, only raising a part of the same size to 102°.

According to this, a very rude,* but I believe, moderate statement, the waste of the principle by which caloric is evolved from the blood in an inflamed part, is about five times less than in the same part when sound; so that we readily account for both the increased temperature and arterial colour of the former, although the rapidity of the circulation is greatly lessened.

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* It is evidently impossible in this case to arrive at perfect accuracy, as we can neither determine exactly how much the quantity of blood, or size of the part, is increased. All that can be looked for is, to be assured that we err on the safe side, and do not assume too much. There is every reason to believe, that the quantity of blood in an inflamed part is often more than ten times that which circulates in it while sound. Another circumstance which must be a cause of some inaccuracy in such a statement is, that the change which takes place in the blood is not the only source of animal temperature, many of the secreted fluids having

But may not the rapidity of the circulation, it may be said, be so much lessened as not to be compensated for in this way? When the circulation ceases altogether, as in the most inflamed parts in the foregoing experiments, when consequently there can be no supply of that principle by which caloric is evolved from the blood, what then preserves the increased temperature and florid colour of the part? The increased temperature and florid colour then disappear; the temperature sinks, the part assumes a purplish hue, and soon dies, that is, becomes gangrenous.

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having a less capacity for caloric than the blood. It could easily be shown however, that the error occasioned by this circumstance is too inconsiderable to be taken into account.

As soon as it was determined that the change which the blood undergoes in the course of circulation is a principal source of animal temperature, we might a priori have determined, that the evolution of caloric from the blood is diminished in proportion as the temperature is increased.

On the supposition that the change induced on the blood is the only source of animal temperature, and we certainly do not err much by making this supposition, if it evolved the same quantity of caloric at all temperatures, the temperature of any part would be directly as the quantity of blood circulating in it, and inversely as its bulk, the rapidity of the circulation being supposed the same. One consequence of this would have been, that the temperature of certain parts, the brain for instance, in which so large a proportion of blood circulates, would have been considerably higher than that of others.

It appears from what has just been said, that although the unusual supply of blood to such parts may raise the temperature a little, yet its chief effect is that of preserving the blood more in the arterial state, the arterial blood appearing to be particularly favourable to certain functions of the body.

Did not the evolution of caloric cease at a certain temperature, every scratch must have proved a sore capable of terminating existence in excruciating pain. For then the temperature of a part being nearly as the quantity of blood it contains, and inversely as its size, and the quantity of blood in an inflamed part being increased in a so much greater proportion than its size, the temperature must often have been sufficient to destroy the texture of the finer parts wherever the inflammation spread.

One symptom of inflammation still remains to be considered, which is not indeed mentioned in the definition, as, however remarkable, in many cases it is often distinguished with difficulty, namely, the increased pulsation of the larger arteries of the part, and in the Phlegmasiæ, of the heart and whole arterial system.

The final cause of this symptom is sufficiently evident; as the inflamed vessels are debilitated, an increase of the vis a tergo is at once a means of promoting the circution in the part, and stimulating the debilitated vessels to action. Thus we find, that wherever the vis a tergo is much diminished, the circulation in an inflamed part is apt to fail altogether, and gangrene to supervene. We shall find indeed that gangrene is often the consequence of the vis a tergo being too great, and consequently overstretching the vessels of the inflamed part; so that a principal object in the treatment of inflammation is to regulate the vis a tergo, neither permitting it to fall too low or become too powerful.

But although there is no difficulty in perceiving the final cause of the symptom we are considering, the efficient cause is involved in obscurity. The increased action of the arteries in the vicinity of an inflamed part, may in some measure depend on the increased stimulus, from the impediment to the passage of the blood through the debilitated vessels. But when more distant vessels, and particularly when the whole system is affected, we cannot attribute

bute it to this cause, especially when we reflect that the slightest inflammation of an important viscus, the stomach for instance, will excite fever, while a very extensive inflammation in the skin or muscles is often unattended by this effect. We are forced therefore, for an explanation of the phenomena, to look to the nervous system, which connects the most distant parts of the body and conveys impressions from one to the other. But to trace the changes which take place in it, and the manner in which these excite the larger arteries in inflammation, is as impossible as to trace the changes produced in it by an emetic, and the manner in which they excite the action of the abdominal muscles and diaphragm. Neither in the case of vomiting nor inflammation can we detect the changes induced on the nervous system; but if what has been said be just, we understand the nature of the one operation, as well as that of the other, and both as well as we probably ever shall understand them.

I might now shew in what manner the operation of the remote causes is explicable on the doctrine of inflammation we are considering, and consequently tend to support it. But when we recollect that it appears from the foregoing experiments, that whatever diminishes the action of the vessels of the part, occasions, and whatever increases it tends to cure, inflammation, the manner in which most of the remote causes act is too evident to require any explanation.

If inflammation depend on the diminished proportion of the power of the capillaries to the vis a tergo, it will, it is evident, be most apt to supervene under the three following circumstances. 1. In a state of plethora, because then all the vessels are overdistended, and consequently any cause tending farther to distend any of them, whether it be a cause debilitating them, or increasing the vis a tergo, will be more felt than in health. 2. In a state of general debility, because then the vital powers in any part are more readily destroyed than in health. 3. In a state of general excitement, because then the vis a tergo is every where strong, and consequently apt to occasion distension of the vessels wherever any degree of debility occurs. These are the states of the system, it has been observed above, which are found to predispose to inflammation. In the first and last the inflammation is generally of that kind which has been termed active, the vis a tergo is considerable, the larger arteries being readily excited to increased action. In the second of the above states what is termed passive inflammation is most common, the larger arteries, in proportion as the system is debilitated, being less readily excited.

The greater the general debility, the greater, it is evident, must be the partial debility before inflammation can take place, because, however debilitated the vessels of any part may be, inflammation will not supervene if the vis a tergo is debilitated in the same proportion; hence the partial debility in such cases must be very great, and consequently the inflammation will soon run to gangrene, as happens in the inflammations so readily excited in typhus, &c. Nay, in cases of extreme debility an injured part runs to gangrene almost without any symptom of inflammation, the vis a tergo being too feeble to distend the vessels, however much debilitated. The reader I hope will admit that it is unnecessary to dwell longer on this part of the subject.

May we not conclude from what has been said, not to speak of a variety of other facts which will occur as we proceed to support the same opinion, that inflammation arises from debility induced on the capillaries, the consequence of which is, that the larger arteries of the part, and sometimes of the whole system, are excited to increased action, in order to correct this morbid state, in the same way in which the diaphragm and abdominal muscles are excited by an emetic, in order to expel the morbid contents of the stomach? And it is as easy to perceive how the one, as the other, set of motions act; for if we can remove inflammation by stimulating the vessels by distilled spirits, may it not also be removed by an increased vis a tergo?

Here it may be objected, that an increased vis a tergo, so far from being a means of cure, appears, from what has been said, to be a principal cause of inflammation. It appears, from what has been said, that inflammation may arise either from a debility of the capillaries, or an increased vis a tergo. If from the latter cause, it can only be cured by diminishing the vis a tergo, which is lessened in proportion as the excitability of the larger arteries is diminished by their excessive action, or as we diminish it by means we are immediately to consider. But when the inflammation arises from the debility of the capillaries, the vis a tergo, it is true, also sometimes becomes too powerful, but are we not often obliged to have recourse to means which increase it, to bark and wine, and would not means to increase the vis a tergo be necessary in all cases of inflammation which originate from debility of the parts, did not the nature of the system itself supply them; for if the vessels of an inflamed part can no longer be excited to due action by the usual vis a tergo, is there a means more proper to excite them than in increasing the stimulus on which their action at all times depends? But will not increasing the vis a tergo, it may be said, farther distend and debilitate? It certainly must farther distend, but whether that farther distension farther debilitates, or excites to action, must depend on the degree of excitability which remains in the vessels.

Of the Terminations of Inflammation.

The most common terminations of inflammation are, Resolution, Suppuration, and Gangrene.

Of the first there is little to be added to what has been said. We have seen in the foregoing experiments that, in proportion as we succeed in exciting the capillaries of an inflamed part to action, we relieve the inflammation. When an inflammation is cured by resolution, that is, without the destruction of any of the parts it occupies, the vis a tergo has succeeded in exciting the capillaries to action. Resolution is often promoted by an effusion from the inflamed vessels, for when the vessels are so much debilitated by distension that the only effect of the vis a tergo is farther to distend them, there is no hope of exciting them to action without diminishing the volume of fluid which distends them. The fluid discharged in such cases is often serum or coagulable lymph. If the inflammation has its seat in a secreting organ, its secretion is generally increased, and sometimes, particularly on secreting surfaces, the fluid discharged we shall find is a true pus, for it will appear that the formation of pus is not uniformly, though generally, attended with a destruction of parts. Whether the termination by a secretion of pus,* the texture of the parts remaining entire, deserves the name of suppuration or resolution, it is of little consequence to enquire. It belongs to the latter according to the definitions which I adopt.†

The resolution of inflammation is sometimes promoted by a discharge, not from the part itself, but some other, often from a neighbouring secreting organ, sometimes, particularly where the whole system is affected, by a discharge of blood in consequence of the rupture of vessels in some of those parts of the system where they are most numerous and delicate, the internal nares, lungs, &c.

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* We shall presently have occasion to consider the nature of this fluid.

† It was once supposed that pus is never formed without the destruction of parts, but this opinion, we shall find, succeeding observation has proved to be unfounded.

When inflammation terminates by suppuration, there is a destruction of a certain portion of the inflamed part, in consequence of which a cavity, termed an abscess, is formed, which from the first is filled with pus, the quantity of which increases in proportion as the cavity enlarges.

It has been a prevalent opinion, that pus is nothing more than serum discharged during the inflammation, and changed by stagnation. The experiments however of Sir John Pringle,* and of Mr. Gaber,† at one time regarded as conclusive, it is now generally admitted, do not warrant the inferences of these writers.

Brugman, in the first section of the second chapter of his Puogenia, has ascertained that the sediment from the serum is not the same with purulent matter. "Nec "juvat unum alterumve prædicatum habu-"isse commune, aut externo habitu quo-"dammodo convenire. Quid enim inde, "nonne et cremor lactis varia cum pure "communia habet? Utrumque album est "viscidum blandissimumque."

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* The Appendix to Sir John Pringle's work on the Diseases of the Army.

† Miscell. Taurin. vol. ii.

In the second section Brugman compares pus with the coagulable lymph of the blood, in the third with the buffy coat, in the fourth with the muscular fibre, in the fifth with fat; and from all his experiments concludes, "Naturam corruptione vel partium quali-"umcumque putredine tanquam medio in "creando pure non uti." This inference is confirmed by the observations of Mr. Home,* who made a set of experiments, to ascertain the different steps of the formation of pus.

He found pus formed by means of a blistering plaster in twenty hours; by means of the microscope he from time to time examined the discharge while it was changed from a colourless fluid into pus. In another experiment he found that pus is formed by irritating the urethra in the short space of five hours, and that in half an hour the discharge begins to assume the purulent appearance.

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* A Treatise entitled, "On the Properties of Pus, by Everard Home."

He also found that it has not this appearance, which is occasioned we shall find by the presence of globules, when it is first poured out, but acquires it while it remains on the inflamed surface, and that this change takes place as readily, although the matter discharged be removed while it still remains colourless, provided the proper temperature be preserved, as when it remains on the part. The change to the purulent appearance is promoted by exposure to the air.

Mr. Hunter was led, from the phenomena of inflammation, to regard pus as a secreted fluid. He found vessels formed in extravasated blood and lymph, and supposes that in the extravasated lymph, which precedes the formation of pus in wounds, a system of vessels is formed for the secretion of this fluid.

Mr. Home adduces several facts to countenance this opinion. In performing the operation for strangulated hernia, he observed the intestines smooth and polished; an inflammation supervened and speedily proved fatal, and the body was opened within twenty-four hours after the operation. On various parts of the inflamed intestines, whose surface the day before had been uniformly smooth, there were found small quantities of extravasated lymph in which vessels were formed. Pus, he observes, is more readily formed by secreting surfaces, on the skin for example and in the urethra, than in the body of a muscle. Many proofs of the tendency of secreting surfaces to form pus will occur in considering the Phlegmasiæ. The part in which pus is about to be formed assumes a more vascular appearance, that is, more of the appearance of a gland; and pus bears much resemblance to some secreted fluids, particularly milk and the pancreatic juice.

But independently of these reasons, which

Mr. Home justly considers as favourable to the opinion, if it can be shewn that pus is different from any of the component parts of the blood, and that neither these nor the solids are by any spontaneous change convertible into pus, the only opinion we can form is, that pus is a secreted fluid. What other proof have we of the nature of many secreted fluids, in which the glandular structure is at least as obscure as in the case of suppuration?

But the manner in which pus is produced is of less consequence than a criterion to distinguish it from other fluids, which in some cases, we shall find, an object of the first importance.

Chemical analysis, it is probable, will never enable us to distinguish pus with sufficient ease to render the distinction useful. Most animal substances, when chemically analised, give very similar results. Other means of distinguishing pus have therefore been looked for.

Brugman,* Mr. Darwin,† and others,

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* Brugman's Puogenia.

† Experiments determining a criterion between mucilaginous

have attempted to distinguish it by its chemical properties. To determine, however, with certainty the presence of pus, by their criteria, supposing them accurate, requires more experimental nicety than is possessed by the generality of practitioners. The most useful tests, as far as I am capable of judging, are those proposed by Mr. Hunter:* Its coagulation by sal ammoniac, and globular appearance through the microscope. If to these we add some of the most remarkable of its other properties, we shall seldom be at a loss to distinguish it.

The following is the selection made by Mr. Home. Pus is of the consistence of cream, its colour is whitish, it has a mawkish taste. When cold it is inodorous, when warm it has a peculiar smell. Examined by the microscope it consists of semi-opake globules, and a transparent colourless fluid, which is coagulated by sal ammoniac. Pus may be evaporated to dryness without coagulating. Its specific gravity is greater

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cilaginous and purulent matter, by Mr. Charles Darwin.

* See Mr. Home's paper, just alluded to.

than that of water. It does not putrify readily. It is not readily diffused in cold water. In warm water it is readily diffused, and remains diffused after it cools.

Mucus is the fluid from which it is of most consequence to distinguish pus, which may, for the most part, be readily done by the foregoing properties. With respect to the test most commonly employed for this purpose, derived from the specific gravity of the two fluids, it is very fallacious. The specific gravity of the mucus of those cavities to which the air is not admitted, is greater than that of water,* and even in those to which the air has free access, if allowed to stagnate, by which its thinner parts are absorbed, it becomes so; thus it is not uncommon, as I have often observed, for the expectoration of mucus in the morning, when it has lain during the night in the trachea and its branches, to sink in water; and on the other hand, when pus, which is specifically heavier than water, has entangled small globules of air, which frequently happens in that which comes from the lungs, it will remain suspended in water.*

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* Mr. Darwin's paper above alluded to.

From the animal fluids, which bear a greater resemblance to pus, Mr. Home points out the following means of distinguishing it.

From chyle it differs in its globules being larger, and in its not coagulating by exposure to air and a high temperature.

The globules of the pancreatic juice are smaller than those of pus.

Solutions of animal matters contain flakes instead of globules, or at the same time with globules.

The globules of milk are nearly of the same size with those of pus, but much more numerous. Milk coagulates by runnet; pus does not. Milk contains oil and sugar, which are not found in pus.

Pus is distinguished from the discharge from ill conditioned ulcers, by the latter containing flakes; from the thin matter of blisters, by this containing neither flakes nor globules. It is also a property of pus that it separates readily from the sore, discovering granulations on the places it covered. X

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* "Corrosive sublimate coagulates mucus but not "pus." Mr. Darwin's paper on pus and mucus.

It has been the opinion of some, that pus may be formed without previous inflammation. This opinion Mr. Home combats, and observes that the matter discharged where there had been little or no previous inflammation, differs materially from true pus. Instead of being globular, it has a curd-like appearance, and contains flakes.

The formation of proper pus seems to depend much on the state of the circulation in the part, and in the system in general. The author just mentioned found that, cet. par. pus is more apt to degenerate the farther it is from the heart, and relates a striking instance, in which a cause affecting the whole system produced at one time a sudden alteration in the matter of the sores, of no less than twenty patients. From a sudden change of weather, instead of a well formed pus, coagulable lymph was spread over their surface like melted tallow, adhering to it with such force that it could not be separated without injury. I have seen a similar instance. Few indeed have attended hospitals without meeting with such.

The discharge from ill conditioned sores is very various. Instead of coagulable lymph or a flaky discharge, they often pour out a thin ichorous matter which, examined with the microscope, is found to contain few or no globules. It is often mixed with blood, probably in consequence of its eroding some of the small vessels.

Mr. Home made some experiments to determine whether pus, as some have supposed, is capable of eroding the animal solids, the result of which is, that the purer pus is, the less it has of this property, and that the purest pus is a very mild fluid.

When suppuration commences in an inflamed part, the pain and redness generally abate, the temperature falls nearer the healthy degree,* and the throbbing becomes more sensible. In the phlegmasiæ we shall find the commencement of suppuration indicated also by certain symptoms affecting the system in general.

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* When however the matter is confined by the less yielding parts of the body, the inflammatory symptoms often do not abate till it is discharged.

The matter of an abscess is either absorbed or discharged, and in either case, if it is well conditioned, the cavity is gradually filled up by an operation of nature, which is termed granulation, from the new parts appearing in the form of small red grains. When this process is most favourable, the granulations are of a florid red colour, and proceed in a regular manner till the cavity is accurately filled, its edges (if the matter of the abscess has been discharged externally) being even or nearly even with the sound skin.

When the granulation is too languid, it is to be promoted by the same means which promote a favourable secretion of pus. It is sometimes too luxuriant, forming irregular masses which project beyond the lips of the wound; it is necessary then to check the granulating process and destroy the projecting parts by escarotics. But for more particular information on this part of the subject I must refer to the works on surgery.

Although the cavity of a favourable abscess is always filled up, it is never with matter exactly similar to that which was destroyed. It is often, however, with such matter as is capable of performing the function of that which has been destroyed. Thus the matter formed in wounds of the skin, tendons, ligaments, bones, and some other parts, performs the functions of these parts; sensation has sometimes been restored through a nerve which had been divided. The matter formed in wounds of muscles or glands appears to be wholly incapable of performing the office of these parts.*

The last of the more common terminations of inflammation is gangrene and mortification. The former of these may be regarded as a less degree of the latter. Under Dr. Cullen's seventh genus, (Phlogosis) he gives the following definition of gangrene,

"Post phlogosin, pars livens, mollis, "parum sensibilis, sæpe cum vesiculis ichorosis."

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* See Mr. Moore's paper on the filling up of cavities, &c.

Such is the appearance which precedes mortification; the circulation soon fails altogether, the vessels are obliterated, or an ichorous and bloodly matter runs from their relaxed extremities, and complete mortification soon ensues. Mortification, or, as it is termed by medical writers, sphacelus, is defined by Dr. Cullen,

"Post gangrænam pars nigricans, flac-
"cida, facile lacerabilis, sine sensu vel calore,
"et cum fœtore carnis putridæ: vitio cele-
"riter serpente."

It happens however, especially in some cases where gangrene comes on without much previous inflammation, that the mortified part assumes a different appearance, becoming dry and hard, as, for example, in the sphacelus produced by caustic. It has then been termed necrosis, or the dry gangrene. As in the case of suppuration, gangrene in the phlegmasiæ is attended with a change in the state of the general symptoms, which will presently be considered.

The more moderate the different symptoms, the better is the chance of the inflammation terminating by revolution; when it is of the pustular kind and does not readily yield to proper remedies, or when erythematic if unusually obstinate and deep-rooted, there is reason to believe that it will terminate by suppuration. When the symptoms are very violent, especially if the inflammation is of the erythematic kind, we have reason to fear gangrene.

Resolution is always a favourable termination. Suppuration is also favourable, if the inflammation be external and the habit good, but in internal inflammations we shall find it is generally to be dreaded. Internal gangrene is always fatal. It is only when the gangrene is external that medicine can avail, and then it often fails.

Such are the more common terminations of inflammation; the only one which remains to be mentioned is that by Schirrus, for with respect to that by hemorrhagy and other evacuations, I have considered them as coming under the head of resolution, they are to be regarded as nothing more than different means of promoting this termination.

"The schools," Dr. Cullen observes, "have generally marked a fourth termi-
"nation of inflammation, which is by a
"schirrus, or an indolent hardness of the
"part formerly affected with inflammation.
"This however is a rare occurrence, and
"does not seem to depend so much on the
"nature of inflammation, as upon the cir-
"cumstances of the part affected. It is in
"glandular parts chiefly that schirrosity
"is observed, and it is probably owing to
"the parts readily admitting stagnation of
"the fluids. I have observed that inflam-
"mation seldom induces schirrus, but that
"this more commonly arises from other
"causes; and when inflammation super-
"venes, which it is sooner or later apt to
"do, it does not so commonly increase as
"change the schirrosity into a kind of ab-
"scess. From these observations it does
"not seem necessary to take any farther
"notice of schirrus as a termination of
"inflammation."

Other terminations or rather consequences of inflammation will be noticed as we proceed in considering the phlegmasiæ, depending, like schirrus, on the structure of the part, as palsy or rigidity of the muscular fibres, opacity of the cornea, &c.

Of the Treatment of Inflammation.

It appears from what has been said of the terminations of inflammation, that resolution is that which is to be wished for in all cases. But in inflammation unattended by fever, which is always external, suppuration is also a favourable termination, if the habit is good. The treatment of external inflammation, therefore, divides itself into two parts; the indications being, in the first instance, to procure resolution, or if this fails, to promote suppuration; but as simple inflammation is generally a slight disease, considerable inflammations though external being always accompanied by fever, I shall not here enter fully into the mode of treatment.

Much has been said of the modus operandi of the means which promote resolution,

tion, all of which may be arranged under two heads.

1. Those which lessen the volume of fluid distending the debilitated vessels, either by directly abstracting part of that fluid, which is done by evacuating part of it, or by occasioning a conjestion in some neighbouring part; or by diminishing the vis a tergo which occasions the accumulation.

2. By the application of stimuli to the inflamed part, by which the debilitated vessels are excited to action.

How perfectly the operation of these means correspond with the foregoing doctrine of inflammation, need not be farther pointed out. It has generally been considered very explicable indeed on the old hypothesis; but for the fallacy of that explanation it is only necessary to appeal to the foregoing experiments. It is true indeed that, did inflammation depend on a morbidly increased action of the inflamed vessels, it would be relieved by abstracting part of the fluid which supports this action. But how shall we explain the effects of astringents and other stimuli applied to the inflamed part? These, we are told, exhaust the excitability of the inflamed vessels, and thus moderate their action. But it appears from the foregoing experiments, that the effect of these is that of increasing the action of the inflamed vessels, and that it is only in proportion as they have this effect that they relieve the inflammation.

There is only one case of simple inflammation which deserves much attention, almost the only one indeed in which the physician is ever consulted; namely, when it becomes habitual. It then often proves very obstinate, as in the case of pustules (pimples) or erythema affecting the face, or the latter affecting the hands or feet.

All the local remedies employed in other cases of inflammation are occasionally serviceable. These I shall frequently have occasion to mention, and shall at present therefore confine myself to such as seem peculiarly adapted to what may be termed the chronic cases of simple inflammation.

Pimples and other habitual inflammations of the face, although attended with no danger and little uneasiness, the patient is often more solicitous to have removed than more important complaints. For this purpose the metallic preparations are the most serviceable. Solutions of sugar of lead are often employed with success, but a weak solution of the corrosive sublimate appears to be the most powerful. I have repeatedly seen it successful in the most obstinate cases.

The removal of cutaneous inflammations however, which have become habitual, is often attended with danger. In several instances, in which the inflammation was removed by the application of a solution of corrosive sublimate to the part, I have known severe head-ache the consequence, and, in one instance, almost total blindness. In this case the inflammation was removed by what is termed Gowland's Lotion, the basis of which, it is said, is corrosive sublimate. In one patient the pimples returned, and the head-ache was wholly removed by abstaining from the use of the solution. But, although in the instance just alluded to, on discontinuing the use of the medicine, the inflammation in some degree returned, the sight continued greatly impaired. These solutions generally do not produce their effect till after repeated application.

Of the Local Affection of the Hæmorrhagiæ and Profluvia.

In these, as in the phlegmasiæ, the local affections occasionally appear unaccompanied by fever. As however they form the principal part of the disease, they have obtained the same name, whether with or without fever. The one consists of an increase of some colourless excretion, the other of a flow of red blood; and it is common, whether fever attend or not, to call the complaint hemorrhagy, catarrh, coryza, &c.

In a strict nosological point of view, however, the same observations apply to these affections as to inflammations. They frequently exist without fever, and should therefore have appellations and a place in nosological systems to distinguish them from febrile diseases; and when the reader is informed, that there are hardly two complaints more different in their modes of treatment than such affections when accompanied with fever, and when they are the only complaint, he will be surprised that this distinction has not been made.

To avoid the introduction of new terms, I shall use Hemorrhagy and Profluvium to express the local affections; and to express the more complicated diseases, Febrile Hemorrhagies and Febrile Profluvia.

After what has been said of inflammation, a very few observations on the local affections, hemorrhagy and profluvium, will be sufficient. Like inflammation they are of two kinds, namely, that which is the consequence of local debility, and that which arises from an increased vis a tergo.

The debility and consequent relaxation may be so great as to permit the red blood to escape, as frequently happens in typhus or scurvy. In general, however, the effusion of red blood is the consequence of rupture, either from external violence or increased vis a tergo; hence the frequency of hemorrhagy in synocha. And the vis a tergo being increased in consequence of local debility, as in the case of inflammation, the same cause, viz. the local debility, which renders the vessels subject to rupture, increases the force which distends them, till some vessel giving way the distension is relieved, the vessels recover their tone, and the inflammation ceases. Hence it is, that inflammation is often cured by a spontaneous hemorrhagy from the part; and hence it is that more or less inflammation always precedes what is called active hemorrhagy, that is, spontaneous hemorrhagy in which the vis a tergo is greater than in health.

Thus the only difference between hemorrhagy and inflammation is, that in the former a vessel gives way, the flow of blood relieving the distended vessels in the same way that artificial blood-letting from the part is found to do. And in considering the phlegmasiæ we shall find how much x more powerful a loss of blood from the part is in relieving inflammation than general blood-letting, a circumstance which has not been sufficiently attended to. By the one we diminish the vis a tergo, but by the other while we effect the same purpose, though generally in a less degree, we effect another of still greater consequence in relieving the conjestion in the inflamed part.

I believe few who have been engaged in practice will doubt that sufficiently to diminish the vis a tergo in inflammation, in order to effect by this means alone the cure of the local affection, often requires a greater loss of blood than the patient can bear, and that in other cases, although the consequences of this evacuation are not immediately alarming, yet he often falls a sacrifice to them, after the complaint for which the blood-letting was prescribed is removed. Besides, the debility of the inflamed part is sometimes such, that no diminution of the vis a tergo will enable the vessels sufficiently to recover their tone to expel the blood which distends them.

The different success I have experienced in the treatment of the phlegmasiæ since I trusted more to local, and less to general, blood-letting; prepared as I was to expect it, has surprised me. The application of a few leeches to the part, or to parts in its neighbourhood, has often effected without any sensible diminution of strength, more than

I had reason to expect from copious general blood-letting.

Active hemorrhagy then, or the hæmorrhagiæ properly so called, are spontaneous evacuations of blood which relieve an inflammation, or a tendency to it or to what has been termed congestion, (accumulation of blood in the larger vessels) and in proportion as the hemorrhagy is profuse, the inflammation or congestion, we shall find, is inconsiderable.

Passive hemorrhagy is only a greater degree of that state which we term passive inflammation. When the vessels of a part are greatly debilitated at a time when the vis a tergo, from general feebleness, is much below the healthy degree, but still sufficient to distend the vessels of the debilitated part, passive inflammation ensues; that is, that kind of inflammation in which the local symptoms, as well as general excitement, are inconsiderable, the vis a tergo not being sufficient to distend the vessels to that degree which occasions the pain, temperature, and other symptoms of active inflammation.

But when the relaxation of the vessels is extreme, the blood oozes from their extremities, preventing its accumulation in the part, and consequently the symptoms of inflammation. Thus in bad forms of typhus any irritating cause readily excites languid inflammation of the stomach and intestines; but in extreme cases of typhus, instead of inflammation, dark coloured blood oozes from the sides of these cavities.

But if the relaxation is chiefly in the colourless vessels, and particularly in the exhalants, which frequently happens because the farther vessels are from the heart they are the more easily debilitated, the discharge will be colourless, and this discharge increasing as the vis a tergo increases, prevents much inflammation by preventing congestion.

But should any cause debilitate the red vessels of the part, the smallest of which supply the vis a tergo to those which are still smaller, namely, the colourless vessels, then the serous discharge must cease, from the want of the vis a tergo which supports it, and the smaller red vessels, now debilitated, will be distended by the vis a tergo which impels the blood into them; that is, inflammation will supervene, as often happens from cold in gonorrhœa, coryza, catarrh, &c.; for it is to be remembered, that the heart supplies the vis a tergo to the larger arteries only, the vis a tergo to every set of vessels, whether arteries or veins, being supplied by those which immediately precede them in the course of circulation.

On the other hand, if the colourless discharge by which local congestion is prevented be checked by powerful astringents, the congestion must soon extend to the red vessels, and all the symptoms of inflammation will supervene, as often happens in gonorrhœa, catarrh, dysentery, &c. from astringent applications.

But if in such cases any of the red vessels give way, the flow of blood relieves the congestion, and the symptoms of inflammation are mitigated or disappear.

In the phenomena of symptomatic fevers we shall find all these observations fully illustrated.

It is evident from what has been said, that the local affections of the different orders of symptomatic fevers are of a similar nature, and we readily perceive why they are so readily convertible into each other as we shall find them to be.

Having now considered simple fever, and the different local affections of symptomatic fevers, we are prepared to take a view of the various combinations of these complaints which have been arranged under three heads, Phlegmasiæ, Hæmorrhagiæ Febriles, and Profluvia Febrilia.

BOOK I.

OF THE PHLEGMASIÆ.

THE Phlegmasiæ are those symptomatic fevers in which the local affection is inflammation; when this is external, it is known by the symptoms already laid before the reader; when it is internal, a fixed pain and lesion of function point out its seat. To prevent repetition it will be proper, before we enter on the particular species of the phlegmasiæ, to make some general observations on this order of disease.

CHAP. I.

Of the Symptoms of the Phlegmasiæ.

THE only mark of distinction which can be given between simple inflammation and the phlegmasiæ is the presence of fever in the latter. There is certainly some difference between a pimple and a boil, and between erythema of the face and erysipelas. And this difference in general is sufficiently evident; yet when we come to enumerate the symptoms, we find the general increase of temperature and frequent pulse the only ones to distinguish them. In both instances the symptoms of the local affection are redness, increased temperature, pain, and swelling, the only difference which can be pointed out being merely in degree.

We cannot therefore give any other account of the local affection of the phlegmasiæ than has been given of simple inflammation. Between the two sets of diseases the fever is a sufficient diagnosis, the want of any other is not therefore to be regretted.

The combinations of inflammation and fever are of three different kinds, to one of which only the term phlegmasiæ is applied; the others being of a nature very different from phlegmasiæ, and requiring very different modes of practice.

Inflammation and fever may be combined by a simple inflammation supervening on fever, as in the exanthemata; or they may be combined by the inflammation producing fever, as in the diseases we are about to consider,

sider, the phlegmasiæ; or by a phlegmasia (that is, the inflammation and the fever it occasions) supervening on simple fever.

The first of these is readily distinguished, by the appearance of the inflammation not aggravating the fever. The last is readily distinguished where the phlegmasia supervenes a considerable time after the commencement of the fever, as happened in many epidemics alluded to in the first and second volumes of this work, in which inflammation of the stomach, bowels, brain, &c. supervened on intermittent or continued fever, or on the exanthemata, forming complaints essentially different, although they have not always been accurately distinguished, from the phlegmasiæ.

But when the phlegmasia supervenes soon after the commencement of the fever, the diagnosis, although still necessary in regulating the treatment of the complaint, is more difficult. All that can be said on this subject, as far as I am capable of judging, is, that wherever the fever appears unaccompanied by external inflammation, or any of those local affections which we are about to consider as denoting the presence of an internal inflammation, however early such symptoms may supervene, the case is to be regarded as a complication of fever and phlegmasia, whether they arise from the same causes or not.

This appears to be the only accurate view of the subject, for it must be granted that if the fever has lasted for a considerable time, some days for example, before the local affection appears, the case is complicated. If then it be asserted, that there are cases of phlegmasiæ in which the fever shews itself before the symptoms denoting the local affection, the question arises, how long may the fever last before the appearance of such symptoms, and the complaint be regarded as a simple case of phlegmasia? If we admit that to be a simple case in which the fever lasts a few hours, we must also admit that to be simple in which the fever lasts for some days, before the appearance of the local affection.

The truth is, that in the true phlegmasiæ both sets of symptoms, especially if the seat of the inflammation be internal, appear together. It is impossible to say which appears first, and it is evident, that if any degree of the local affection produces a corresponding degree of fever, the one cannot appear unattended by the other.

But if such is the case, it may be asked, how do we determine which is the primary affection? To this question the following circumstances readily afford an answer. The causes which induce fever, do not at the same time induce inflammation. In 19 cases out of 20 inflammation does not supervene on fever, and when it does it generally arrives from causes different from those which induced the fever. But if, on the other hand, inflammation, that is, such as attends the phlegmasiæ, be excited, fever is the constant attendant, and its degree is proportioned to that of the local affection.

Besides, as we succeed by local remedies in relieving the inflammation, we find that in precisely the same degree the febrile symptoms abate. If the inflammation be not terminated by resolution, but run on to some of the other terminations, the febrile symptoms are still found to correspond exactly to the changes which take place in the local affection, and so constant is this correspondence, that we can determine, from the state of the febrile symptoms alone, in what way the inflammation is terminating, although the termination be induced by means whose action is wholly confined to the inflamed part.

If, then, fever is not necessarily attended with the inflammations which appear in the phlegmasiæ, if such inflammations are universally attended with fever, the degree and state of the inflammation regulating those of the febrile symptoms, the conclusion is, that in the phlegmasiæ (and the same mode of reasoning applies to the other symptomatic fevers) the local affection is the primary complaint. I have therefore mentioned the local affection in the first part of the character of symptomatic fevers; and Dr. Cullen seems to fall into an inaccuracy of some consequence when he mentions the febrile symptoms first in his characters of the phlegmasiæ, hæmorrhagiæ, and profluvia. It is from regarding the fever as the principal part of these diseases, that physicians have trusted so much to general, and so little to local, means in their modes of treatment.

This inaccuracy in Dr. Cullen's definition (for such I think it will appear from what will be said of symptomatic fevers) may be traced to the same source with others mentioned in the general Introduction. For since his method obliged him to arrange under one class idiopathic and symptomatic fevers, it induced him to give the latter as much the appearance of the former as possible, by mentioning in the first part of his definitions the febrile symptoms as if the most essential part of the disease.

Nay, it has even been maintained by some, that the local affection in the phlegmasiæ is the consequence of the general disease, and that when the inflammation proceeds merely from a local cause, the disease is not a true phlegmasia. Of this opinion it is unnecessary to say any thing at present, we shall soon meet with a sufficient number of facts to refute it.

In the phlegmasiæ, then, the local affection is the primary complaint, and it either appears before the febrile symptoms or at the same time with them. In considering the symptoms of the phlegmasiæ, then, it is proper to begin with the local symptoms.

When the inflammation in the phlegmasiæ is external, no other description can be given of it than that which has been given of simple inflammation. The inflamed part in both cases is affected with redness, pain, increased temperature, and swelling, these symptoms however, being more considerable in the former.

Like simple inflammation, the local affection of the phlegmasiæ may be divided into that in which the redness and swelling are diffused, and that in which they are circumscribed.

Although the line of distinction between the true simple inflammations and the phlegmasiæ is well marked, the one never running into the other, (we never see pimples or habitual erythema of the face produce fever) yet there are some external inflammations which may be regarded as forming the link of connection between simple inflammations and the phlegmasiæ. Thus a small boil is unattended by fever, but if it be increased by local irritation for example, it then occasions fever, farther proving the fever in the phlegmasiæ to be the consequence of the inflammation.

It may be observed indeed of all the phlegmasiæ in which the inflammation is external, that in their symptoms, prognosis, and mode of treatment, they approach nearer to the nature of simple inflammation, than the other phlegmasiæ do. The fever is more moderate, the mode of treatment less vigorous, and the prognosis much better. In inflammations of those parts which can neither be regarded as wholly external or internal, the fauces, rectum, meatus auditorius, muscles, &c. the degree of fever and the prognosis are between these extremes.

Upon the whole it may be observed, that the nearer the seat of inflammation is to the brain or stomach, the more considerable the fever and the greater is the danger. Inflammations of the head are the more dangerous, the nearer they approach the brain, and inflammation of the brain is the most dangerous inflammation of the head. Inflammations of the trunk are the more dangerous, the nearer they approach the stomach. Inflammation of the œsophagus, for example, occasions a greater degree of fever, and is more dangerous than inflammation of the fauces; and inflammation of the duodenum than inflammation of the colon; and inflammation of the stomach is not only more dangerous than any of these, but also than inflammation of the lungs or of any other part of the trunk. Lastly, inflammations of the extremities are less dangerous than those of either the head or trunk.

We determine the presence of internal inflammation by certain symptoms which, from dissection after death it has been determined, always indicate this species of derangement. These symptoms are shortly enumerated in the above definition of the phlegmasiæ. "Febris symptomatica, dolore "topico, simul læsa partis internæ func-"tione;" and no farther account of these symptoms need be given, for wherever there is fixed pain, derangement of some internal function, and fever, we have reason to believe that local inflammation is present, which is placed beyond a doubt if the pulse be hard.

It appears from what was said of inflammation, that when it is present to a considerable extent, and at all times when it affects a vital organ, the whole sanguiferous system is excited to increased action, the final cause of which appears to be, to restore circulation in the debilitated part. The muscular fibres of the vessels, it was observed, run transversely, so that the effect of unusual action must be, that the vessels embrace their contents more forcibly, and consequently feel harder, and the difference between a strong pulse and a hard pulse seems to arise from the artery in the latter case never being wholly relaxed, while in the strong pulse, however powerful the contraction may be during the systole, we have reason to believe that there is a compleat relaxation during the diastole, so that the vessel forcibly embraces its contents only for an instant, and therefore feels soft.

In the case of the hard pulse, the end being to propel the blood into the debilitated vessels of the inflamed part, the arteries in the neigbourhood of these vessels forcibly embrace their contents, although in a less degree, during the diastole, seemingly to prevent any degree of regurgitation, and at length the whole arterious system is affected in the same way, so that, however debilitated the circulation becomes, while the inflammation lasts, the hardness of the pulse is still remarkable, and by this means, we shall find, we may often detect the presence of inflammation when there is no other symptom to guide us.

But the foregoing symptoms not only leave no room to doubt the presence of inflammation, but also point out its seat. When we know the seat of the pain, as we know that of the different viscera, we conjecture which is affected; but when we, at the same time, observe what function is affected, the matter is generally placed beyond a doubt. Thus if the patient informs us that the pain is in the chest, we suspect the lungs to be the seat of the inflammation, but if, at the same time, we perceive the breathing to be difficult, and no other function more deranged than is usual in the same degree of fever, we no longer hesitate in pronouncing the diease to be inflammation of the lungs.

If along with these symptoms there are irregular motions of the heart, we *suspect* that the inflammation has spread to this organ or its membranes, and in proportion as this symptom or the difficulty of breathing is most considerable, we judge the chief seat of the inflammation to be in the one place or the other. If hiccup supervene, we suspect it has spread to the diaphragm. In like manner, when the patient tells us that the pain is in the region of the stomach, and he is distressed with thirst and incessant vomiting, we know that he labours under inflammation of the stomach; and so on.

But the manner in which we form our opinion respecting the seat of the inflammation, is not so simple in every case as in these; which arises from the sympathy of parts, for it often happens, that although the inflammation is confined to one organ, yet the pain, and even derangement of function, extends to parts in its neighbourhood. Thus in inflammation of the kidneys, pain is often felt in the stomach, and its functions are often as much deranged as those of the inflamed part.

Nay, a pain is often felt in a distant part while there is no pain whatever referred to the part affected. In inflammations of the liver for example, the pain is sometimes confined to the right shoulder. It also sometimes happens, that the functions of neighbouring parts are more obviously deranged than that of the part affected. In inflammation of the liver the patient is often attacked with dyspnœa and cough, or with vomiting, or with hiccup, while on dissection it is found that the liver alone was the seat of inflammation.

It is not meant that inflammation of the liver never spreads to these parts, oscasioning such symptoms; this indeed, we shall find, is a frequent accident; but it is well known, that the inflammation has not, in every case where the foregoing symptoms attend, spread to neighbouring parts.

In such cases, which we shall soon have

occasion to consider at length, it is often very difficult to determine precisely the seat of the inflammation; sometimes, we shall find, it is impossible, but fortunately it is not always necessary, and a person well acquainted with the symptoms of the phlegmasiæ, will never find himself at a loss to determine the seat of the inflammation with all the accuracy that is requisite in practice; for although neither the pain nor lesion of function is always observed in the part affected, yet both the one and the other are always the same or similar when the same part is affected, at least in the same degree, and in the affection of no other part does the same combination of symptoms occur. Thus some difficulty of breathing, sickness at stomach, or hiccup, with pain in the right shoulder, and a hard and frequent pulse, as certainly denote inflammation of the liver as if the pain were referred to this organ, and accompanied with an evident derangement of its function.

In some of the phlegmasiæ some other

circumstances, particularly an increase of the pain on pressure, assist the diagnosis.

Dissection has ascertained, that in internal as in external inflammations the redness and swelling are either diffused, the latter being hardly perceptible, or more circumscribed, and the swelling considerable.

Such, in a general view, are the symptoms which attend the commencement and progress of the phlegmasiæ.

These, like simple inflammations, terminate by resolution, suppuration, or gangrene. The changes which take place in the inflamed part during these processes are the same as in simple inflammation.

The local symptoms indicating the resolution of internal inflammation, are the gradual abatement of the pain, and the restoration of the function of the inflamed part*

When suppuration takes place, the pain, for the most part, also abates. It is sometimes kept up by the distension which the collection of pus occasions; as in external inflammations, the throbbing often becomes more remarkable during suppuration, or supervenes where it had not previously been perceived. The patient also feels a sense of weight where the collection of matter is considerable, and if the part is not very deeply seated, some degree of fluctuation may be perceived through the integuments.

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* See what was said of the various evacuations which frequently attend the resolution of inflammation when speaking of simple inflammation.

The only local symptom which indicates the terminations of internal inflammation by gangrene, is the abatement or total ceasing of the pain.

It may also be observed, that as far as we judge of the tendency to these different terminations by the local symptoms, we form our judgment in the same way as in simple inflammation. When the pain and derangement of function are unusually obstinate, we have reason to expect suppuration; when unusually violent, mortification. We shall find that our judgment in this respect is also influenced by the nature of the part affected, some of the internal organs, the stomach and intestines for example, being more liable to gangrene; others, as the lungs and liver, to suppuration.

But in ascertaining the tendency of internal inflammations, as well as the manner in which they are actually terminating, we trust more to the general than the local symptoms.

When the fever is moderate, and yields readily to the means employed, we may always hope for resolution; when this termination takes place, the fever abates with the local symptoms, and with them wholly disappears. When the febrile symptoms, though not very considerable, are obstinate, and either yields little to the remedies employed, or soon suffer a new exacerbation, we have reason to dread suppuration; especially if the inflammation has its seat in those organs which are most liable to this termination.

When suppuration begins, the pulse gradually loses its hardness, and becomes fuller, but continues more frequent than natural, and at the same time more or less of a cold stage is formed, the chills often continuing or recurring for many hours or even days, and if the purulent matter is neither absorbed nor discharged, these symptoms are very generally, though we shall find not universally, followed by hectic fever; a species of symptomatic fever, which we shall soon have occasion to consider at length. It is enough to observe here, that it is a fever consisting of evening exacerbations, and morning sweats which never bring complete or permanent relief. It is maintained by some, that two exacerbations in the day may generally be observed in this fever; but of this afterwards.

If the abscess, instead of healing, continues to discharge matter, especially if the discharge is of an unfavourable kind, this fever continues till the patient gradually sinks under it. In this way internal suppurations may prove fatal, or they may terminate life more suddenly by destroying some of the vital organs, or laying open some of the larger vessels, or by the abscess bursting into the cavity of the lungs and occasioning suffocation. If the matter is discharged and the sore heals, which sometimes happens even in internal suppurations, the patient is restored to health.

When in the phlegmasiæ, the febrile, as well as the local, symptoms are unusually violent, we dread mortification, especially if the inflammation has its seat in the parts most liable to this termination. In internal inflammations mortification is always fatal.

As soon as gangrene takes place, the pulse loses its hardness, and becomes very feeble, frequent, and often irregular. The debility is extreme, and the surface is bedewed with partial cold clammy sweats. So sudden and complete in many cases is the relief from pain when mortification supervenes, that the patient, for a short time, often believes himself well. A person acquainted with the nature of his disease, however, knows that a few hours must terminate his life; every doubt of which is soon removed by the rapidly increasing debility. But such is the tranquility of this period, that many, in such circumstances being made aware of their situation, have made their wills; for unless the inflammation has its seat in the brain, it is unusual for coma or delirium to supervene in the phlegmasiæ.

Mortification may take place however without a cessation of pain. When the mortification is confined to a small portion of the inflamed part, the pain may continue to the last, as happened in a case in which I found, on examining the abdominal viscera after death, almost every part of the intestines more or less inflamed, and a gangrenous spot about the size of a sixpence on the stomach.

In such cases it is very difficult to ascertain the presence of gangrene, particularly if the inflammation has its seat in the stomach and bowels, all inflammatory affections of which are attended with much debility from the commencement. To determine the presence of internal gangrene, however, is a point of little moment, as no remedy can avail.

In external gangrene, the presence of which is always readily ascertained, medicine is more serviceable.

Such is the general view of the symptoms of the phlegmasiæ. Considerable deviations from the ordinary course however frequently occur; thus, in some cases, particularly of inflammation of the lungs and liver, anxiety attends instead of pain, sometimes the pulse is not hard; this deviation however is rare, except there is an evident tendency to gangrene. Nay, it sometimes, though very rarely, happens, that inflammation is present without producing any of its usual symptoms.

De Haen, Quarin* observes, met with a case of inflammation of the stomach which terminated in sphacelus, and yet the pulse, within a very short time of the patient's death, was natural. He felt no pain in the region of the stomach, nor were its functions at all deranged. Quarin refers to the works of Morgagni for a case of inflammation of the intestines unaccompanied with pain, and himself mentions a case of the same phlegmasia, in which, although the pain was acute, there was no fever.

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* Quarin De Febribus.

CHAP. II.

Of the Causes of the Phlegmasiæ.

THE remote, as well as the proximate, causes of the phlegmasiæ are the same with those of simple inflammations. The difference of the phenomena, as appears from what has been said, depending not on any difference in kind, but on the different degree or extent of the inflammation, or the nature of the parts it occupies. For the causes of the phlegmasiæ therefore, the reader is referred to the Introduction to the Second Part.

CHAP. III.

Of the Treatment of the Phlegmasiæ.

THE treatment like the symptoms of the phlegmasiæ might be divided into two parts, the local and general; and these might be subdivided, according as our view is to procure resolution or suppuration. It will give a more connected view of the subject, however, to reverse this order, and divide the treatment into that which promotes resolution, and that requisite when suppuration is desirable; dividing the means employed in each case into local and general.

We are now, as it were, to survey a new field in the practice of medicine. The maxims on which the treatment of all the fevers we have hitherto considered, the idiopathic, is founded, are no longer applicable. In the phlegmasiæ we shall find, that the local affection often requires the most vigorous antiphlogistic means, while the excitement is below the healthy degree; and in regulating the employment of stimuli, it is still the state of the local affection that we keep in view.

The most characteristic difference between the treatment of idiopathic fevers and the phlegmasiæ is, that in the latter we employ antiphlogistic means more liberally, and the stimulating plan more sparingly.

It is not meant that the unguarded employment of antiphlogistic means, particularly evacuations, is not attended with danger in the phlegmasiæ. Besides the danger of inducing a state of general debility, if we greatly weaken the vis a tergo, the circulation in the inflamed part may cease altogether, and gangrene ensue.

The acession of gangrene in the phlegmasiæ may be regarded as in some measure analogous to that of typhus in idiopathic fevers. The typhus, we have seen, may be rendered dangerous either by the excess of the previous excitement, or the unguarded use of antiphlogistic measures; in like manner gangrene in the phlegmasiæ is to be dreaded when the various symptoms denoting active inflammation run unusually high, and when antiphlogistic measures have been pushed very far. And as we have seen, that in the former case much judgment is often required to suit the treatment to the symptoms, that is, neither to permit the excitement to run too high, nor unnecessarily to reduce it; so in the phlegmasiæ, while we avoid the risk of gangrene by preventing the inflammatory symptoms from running too high, we must avoid the opposite extreme, lest the vis a tergo be so greatly reduced that it shall be unable to support any degree of circulation in the inflamed part. There is still another consequence to be feared from profuse evacuations in certain cases of the phlegmasiæ, namely, the acute degenerating into a chronic complaint, always more obstinate, and often more dangerous, than the complaint we endeavour to remove.

With regard to the manner in which we judge of the propriety of having recourse to evacuations in idiopathic fevers and the phlegmasiæ, it is very different. In idiopathic fevers, we found, we almost always, cet. paribus, proportion the evacuations to the degree of general excitement; in the phlegmasiæ we, cet. paribus, proportion the evacuations to the violence of the local affection, and we attend to the nature and degree of the febrile symptoms chiefly with a view to ascertain the state of that affection, and, as in some phlegmasiæ, the greater the general depression and debility, the more violent is the inflammation, we sometimes push antiphlogistic measures as far as can be done with safety, on account of the very symptoms, which, in idiopathic fevers, render the tonic plan indispensible. In some of the phlegmasiæ, we shall find that a weak and even irregular pulse indicates the necessity of liberal evacuations.

Such a state of depression, however, is to be carefully distinguished from debility, properly so called. Dr. Fordyce* is almost the only writer who makes this distinction with much accuracy; yet there is none in the practice of medicine of more importance. The former is that species of debility which is occasioned by a sudden exertion, the latter, that occasioned by one more moderate but long continued; the one is permanent, the other transitory. A depression of strength even to syncope may arise from the morbid contents of the stomach, and on the removal of these may cease in the space of half an hour. But debility, properly so called, is that which succeeds profuse evacuations or diseases of long continuance.

A careful distinction between these species of debility is in no case more necessary than in the phlegmasiæ. While in these complaints depression of strength, properly so called, never counterindicates evacuations, real debility often does. How they are to be distinguished in each case will appear as we proceed. They are chiefly distinguished by depression of strength coming on suddenly, and only attending inflammations of particular viscera; while real debility almost always comes on slowly and may attend any of the phlegmasiæ if long protracted.

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* Dr. Fordyce's Dissertations on Fevers.

The extent to which the antiphlogistic plan of treatment is to be pushed in a great measure depends on the nature and seat of the inflammation; if these are such that resolution is the only termination by which the patient can be saved, the evacuations should be more liberal than where suppuration also would be a favourable termination; because, to procure a proper suppuration, a greater degree of general excitement than that most favourable to resolution, is requisite; and it is sometimes better, particularly in external inflammations, to induce suppuration, than to debilitate the patient to the degree that would be necessary to procure resolution.

Such are the general maxims on which the treatment of the phlegmasiæ is founded; it will be proper to consider more particularly the different means employed in these complaints.

Of the Treatment of the Phlegmasiæ when the view is to procure Resolution.

As resolution is the most favourable termination in all the phlegmasiæ, we always in the first place endeavour to procure this termination. It is only where we fail in this attempt, or find that it cannot succeed without inducing a degree of debility more to be feared than suppuration, that we endeavour to induce the latter.

We procure resolution,

1. By removing the remote causes if they still continue to act.

2. By diminishing the congestion in the inflamed part.

3. By diminishing the vis a tergo.

Of the first of these indications little need be said; it is only necessary to be acquainted with the causes of inflammation, in order to remove them if they happen still to be applied.

Of the means of relieving the congestion in the inflamed part it will be necessary to speak at greater length.

These may be divided into two sets; those which relieve the congeſtion by exciting the debilitated vessels, to expel part of their contents: and those which directly remove part of these contents.

Of the first set, several have already been mentioned in speaking of simple inflammation. We shall have occasion to consider many more in speaking of the different phlegmasiæ. Among the metallic preparations most serviceable may be mentioned the blue and white vitriol, the lapis calaminaris, sugar of lead, and corrosive sublimate. They are used either by washing the inflamed part, or parts in its immediate neighbourhood, with solutions of them, or such solutions are made into poultices and kept applied to the parts. When the application is made to a neighbouring part, it seems to relieve the inflamed part in consequence of the sympathy which exists between all contiguous parts.

Many neutral salts, particularly nitre and sal ammoniac, are also employed with success. The same may be observed of alum and other astringents whether mineral or vegetable.

Among the chief applications derived from the vegetable kingdom are vinegar, distilled spirits, opium, some essential oils, particularly that of turpentine. Among the less powerful applications are some of the distilled waters, rose or plantain water, or any other possessed of some degree of astringency; these are good menstrua for more powerful medicines. One of the most powerful of the means we are considering, is the application of cold, and it has been carried so far, that pounded ice and snow have been employed for moderating inflammation. But the application of cold water merely, either by lotion, or poultices frequently repeated, such as those composed of raw potatoes, or other succulent vegetables, is often effectual.

The means which act by evacuating part

of the contents of the distended vessels are upon the whole more powerful; these are of two kinds.

1. Such as relieve the distended vessels by debilitating those of some neighbouring part, in consequence of which, a congestion being formed there, that of the inflamed part is relieved.

The means belonging to this class are termed rubefacients, many of which, and the best means of employing them, we shall have frequent occasion to consider. But these are more powerful if, at the same time that they excite inflammation, they occasion some evacuation. Blisters therefore are found the most successful rubefacients. The evacuation they occasion, however, is slow; and it may be observed of local, as it was formerly observed of general, evacuations, that their effects are, cet. par. proportioned to the rapidity with which they are made.

2. The means therefore, which at once X draw off a considerable portion of the blood distending the vessels of an inflamed part, are generally the most successful,

Of all the remedies employed in the phlegmasiæ there is no other perhaps so powerful, and so generally applicable, as local blood-letting, and when, as in visceral inflammations, we cannot let blood from the inflamed part itself, it often answers nearly as well to draw it from the skin in its immediate neighbourhood.

Local blood-letting is performed either by cupping or by leeches. The former has the advantage of acting as a rubefacient at the same time, and the cupping glasses are often applied as a rubefacient without the scarificator.

In most cases, however, leeches on several accounts are preferable. If the inflammation be external, leeches can be applied to the part, but even where the inflammation is internal, the blood can in general be more suddenly abstracted by a proper number of leeches, and they put the patient to much less trouble.

The principal inconvenience in the use of leeches arises from our not being able to limit with accuracy the quantity of blood lost. If few leeches are applied, the blood is slowly abstracted; if many, the discharge after the removal of the leeches may be too copious; a little lint with moderate pressure is generally sufficient to check the bleeding. Where these can be conveniently employed, it is the best plan to apply a considerable number of leeches; where they cannot, the number must be smaller, and the flow of blood promoted by cloths dipped in warm water, and renewed as soon as they cool.

When either the excitement or the hardness of the pulse is considerable, the more stimulating of the foregoing means, blisters and rubefacients, are exceptionable, as might a priori have been supposed, since they occasion inflammation, which, in the phlegmasiæ, we have seen, is the cause both of the increased excitement and hard pulse. Wherever these symptoms are considerable, therefore, they are to be moderated by evacuations, before we have recourse to such means.

Such are the local remedies employed in the phlegmasiæ, and, in the mildest cases, with proper measures to remove any cause of irritation, they are often all that are necessary. In more severe cases however, general, as well as local, remedies must be employed, and then the third indication is to direct our practice, namely, to diminish the vis a tergo.

This part of the treatment bears a greater resemblance to that of idiopathic fevers; the line of distinction however is still well defined. It is unnecessary to repeat what is the same in the treatment of both sets of diseases; for which I shall refer the reader to the first volume, confining myself to the circumstances in which they differ.

The management of the agents on which the natural and animal functions exclusively depend, is nearly the same as in idiopathic fevers.* What is to be said here, therefore,

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* The slight differences which occur will be noticed in considering the phlegmasiæ separately. We shall then also have occasion to consider a circumstance which, though never a source of irritation in idiopathic fevers, in some of the phlegmasiæ appears to be a very material one. Breathing pure oxygen gas, it has been found, is capable of exciting inflammation of the lungs, (see the experiments of Lavoisier and others)

fore, relates chiefly to those agents which support the vital functions, caloric and the circulating fluids.

As cold is a frequent cause of the phlegmasiæ, the reader will not be surprised to find, that it is never applied so freely in these complaints as in many idiopathic fevers. The opposite extreme however is not less pernicious; the temperature should be moderate, and the drink tepid.

The phlegmasiæ, it has been observed, as well as idiopathic fevers, have their crises. When a tendency to sweat appears in the former, it is to be encouraged by more warmth than is advisable in idiopathic fevers. But even here the hot regimen is not to be pushed far; if the sweat does not flow readily it will probably be of little service.

The most important part of the treatment of the phlegmasiæ still remains to be considered,

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others) and we have reason to believe, that the greater the proportion of oxygen in atmospheric air, the greater is its tendency to excite inflammation; but of this afterwards, in speaking of the cases to which it particularly applies.

dered, namely, the diminution of the vis a tergo by evacuations. Were we at all times capable of taking from the inflamed part, or some part in its neighbourhood, with sufficient rapidity, the proper quantity of blood, there can be no doubt that this would be the most successful mode of blood-letting in the phlegmasiæ. In this class of diseases we have two objects in view from blood-letting, namely, to diminish the conjestion in the inflamed part, which is best performed by blood-letting from the part, and to diminish the vis a tergo, which can only be effected by the loss of a considerable quantity of blood. But as the vis a tergo is supported by the inflammation, if the abstraction of blood be made in such a manner as serves at the same time the purpose both of local and general blood-letting, a less loss of blood will answer the purpose. It is often difficult however, and sometimes impossible, to take the necessary quantity of blood from the part affected, or its neighbourhood; and then we must let blood from the arm as in idiopathic fevers. If, for example, the inflammation have its seat in the head, it is better to take blood from the jugular vein than from the arm; but if it have its seat in the stomach, as there is no considerable vein which can be opened in the neighbourhood of this organ, we take the blood from the vessel which is most convenient. The blood-letting can then only relieve the inflammation by diminishing the vis a tergo, and for this purpose it is of no consequence from what part of the body the blood is taken, provided it be from such a vessel, and with such an orifice, as shall permit it to be taken speedily.

In alarming cases it is sometimes adviseable to let blood from both arms at the same time. The advantage of taking the blood as speedily as possible is the same in the phlegmasiæ as in idiopathic fevers.

It appears from what has been said of the maxims which regulate the treatment of the phlegmasiæ, that we determine the propriety of recommending blood-letting in these complaints, as well as the extent to which it is to be carried, by comparing the state of the general symptoms with the seat of the inflammation, which is determined,

mined, we have seen, by the local symptoms.

The presence of inflammation in most parts occasions general excitement. In such cases we judge of the degree of the inflammation by that of the excitement, and regulate the employment of blood-letting in the same way as in simple synocha, except that the same degree of excitement warrants a more copious evacuation, both because other means are less powerful in the phlegmasiæ, and because in these complaints the excitement is never so considerable, nor succeeded by so great a degree of typhus as frequently happens in idiopathic fevers.

To one part of this observation however, there is an exception in phrenitis, in which the excitement is often as high as in any case of fever. Between a violent degree of idiopathic synocha, and many cases of phrenitis, there is hardly any diagnosis, and hardly any difference in the mode of treatment. The two complaints, indeed, seem often to run into each other, a great degree of synocha frequently occasioning a real inflammation of the brain.

In this organ the effects of a generally increased action of the sanguiferous system must always be most felt, because the blood from it, being returned partly through membranous canals which are not capable of excitement, as all the other parts of the sanguiferous system are, the increase of the impetus of the blood towards the brain must bear a greater ratio to the increased velocity of its return than in any other part of the system. Hence it is, that all increased excitement of the sanguiferous system occasions turgescence in the head, which appears to be a provision of nature to fit us under certain circumstances for unusual exertions, for within certain limits, the more turgid the brain is, the more powerful are the animal functions; hence the effects of desire and rage, which, by increasing the velocity of the circulation, increase our strength, both of mind and body, on many occasions where it is most necessary. In consequence of the valvular structure of the veins where they pass through muscles, the action of the muscles increases the velocity of the circulation. This, from the nature of the circulation in the head, occasions a degree of turgescence there, which by increasing the action of the brain, increases the power of the muscles. Thus, in our exertions, one part of the system supports another till the whole is exhausted, and thus it is that the animal functions are often supported during a powerful exertion, the interruption of which is immediately followed by syncope. To return from this digression.

Inflammation of certain parts, it has been observed, instead of increased excitement, is attended by a state of general debility. In such cases, so far from proportioning the evacuations to the degree of excitement, we employ them the more assiduously the greater and more sudden the diminution of strength, because from this we infer the inflammation to be the more violent.

In such cases indeed it often happens, that the circulation is so much weakened that it is very difficult to procure the proper quantity of blood, and sometimes indeed in a very short time it becomes impossible. In an inflammation of the stomach and bowels which had only lasted ten or twelve hours, I have ordered all the larger veins of both arms and both legs, and also the temporal artery to be opened, without being able to procure more than two or three ounces of blood.

The patient died within 24 hours from the commencement of the complaint. Such cases point out the necessity of having recourse to blood-letting at an early period.

But even where the inflammation is attended with increased excitement, and there can be no difficulty at any period of the inflammatory stage in taking the necessary quantity of blood, yet if resolution be the only favourable termination, the earliest employment of proper means is more necessary than in idiopathic fevers, because after a tendency to suppuration has come on, (and the same remark applies respecting a tendency to gangrene if the inflammation be internal) we have no means of preventing it.

The propriety of having immediate recourse to blood-letting then, in all the more alarming cases of the phlegmasiæ, is unquestionable; and in this most essential respect, therefore, the practice in the phlegmasiæ is more uniform and simple than in idiopathic fevers.

This observation however applies only to the phlegmasiæ not complicated with other diseases. When they supervene on other diseases, or in habits debilitated by previous disease, the employment of blood-letting requires more caution and discernment. Cases of this kind we shall have occasion to consider more particularly in speaking of the phlegmasiæ separately; it is enough at present to observe, that experience has confirmed what, from the foregoing view of the proximate cause, might, a priori, have been supposed, that in such circumstances the indication is rather to relieve the conjestion in the inflamed part than to diminish the vis a tergo, and consequently that we are rather to depend on local than general evacuations. I have seen general blood-letting in gastritis supervening on a very debilitated state of the system, serve no other purpose but that of hastening the fatal termination.

With the exception of such cases, then, to determine the presence of visceral inflammation and the propriety of blood-letting is the same thing. It requires more attention however to determine the extent to which it should be carried, and it is in vain (as some have attempted) to state the precise quantity of blood which must be lost to procure resolution in the different phlegmasiæ. It is true that some phlegmasiæ require more profuse evacuations than others, but the severity of the symptoms, and the strength of the patient, must always influence the treatment.

In visceral inflammations, we immediately have recourse to general blood-letting, because its effects are more speedy than those of any local evacuation. By general blood-letting, we at once diminish the vis a tergo, and hardly ever fail to procure more or less relief.

But the vessels gradually adapting themselves to their contents, the vis a tergo often becomes as great as ever, and thus, when the inflammatory tendency is considerable, the patient often sinks under repeated general blood-lettings. Such is the general practice in visceral inflammations, as if the only indication were to diminish the vis a tergo. The conjestion in the inflamed part which supports the vis a tergo* is overlooked.

If one or two general blood-lettings remove a visceral inflammation, they are the most easy and expeditious means of cure, but wherever the symptoms require such a repetition of this remedy as gives reason to apprehend a dangerous degree of debility, we should always call in the aid of local evacuations, of which local blood-letting is the most powerful.

When therefore the symptoms do not yield to a second general blood-letting, we should, without loss of time, apply leeches, or the scarificator and cupping glasses, as near the part as possible, by which a repetition of the general blood-letting will often be prevented, and the extent to which it will be necessary to carry it, always diminished. It is commonly indeed judged necessary to apply a blister in the neighbourhood of the inflamed part as soon as the vis a tergo has been moderated, but in applying the blister we should always have it in view, that local blood-letting, (for the most part a far more powerful remedy) may be requisite, and leave a part conveniently situated for the application of leeches or the cupping glass.

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* See what was said of the proximate cause of inflammation.

I believe it will generally be found, that a larger blister applied at a small distance, will have the same effect with a smaller one applied nearer the inflamed part; but local blood-letting to be successful must always be near the part affected. A large blister applied between the shoulders will almost as certainly relieve inflammation of the eyes, as a smaller one applied to the temples; but we might in vain endeavour to relieve ophthalmia by leeches applied to the former part.

In cases where resolution is the only favourable termination, we are to repeat the local and general blood-lettings, trusting as much as possible to the former, and employing the latter only to such an extent as the state of the complaint absolutely requires, till the symptoms disappear, or those denoting the presence of suppuration or gangrene take place.

It often happens, that after the vis a tergo has been sufficiently diminished by two or three general blood-lettings, the cure may be completed by local blood-letting alone, and when this is sufficient, which will be known by its effects, no other should be employed.

With respect to the quantity of blood taken at each blood-letting, in an adult of ordinary vigour labouring under visceral inflammation, 14 ounces is a moderate general blood-letting; a moderate local blood-letting is from four to six ounces; and both the, one or the other will be the more effectual the earlier they are employed, and the more quickly the blood is taken.

With respect to the repetition of the

blood-letting, it must be regulated by the effects of that which has been employed. If the symptoms return with diminished violence, a smaller blood-letting will be sufficient; if with equal violence, an evacuation equal to the first will be necessary; and if with increased violence, we must still proportion the evacuation to the state of the symptoms; and the quantity of blood which is sometimes lost, without fatal effects, in visceral inflammations, is astonishing.

There are two changes in the state of the pulse which we wish to obtain by blood-letting (whether local or general) in the phlegmasiæ. The one is, where the pulse is too strong and full, that is the excitement too great, to reduce it; this only applies to those cases where the excitement is greater than natural; but it unfortunately happens, that we cannot employ blood-letting without still farther reducing the excitement, however low it may be. The second change is our aim, in all the phlegmasiæ, to remove the hardness of the pulse, and it is generally in proportion as it has this effect, that blood-letting is about to be successful or otherwise, the reason of which will readily appear from what has been said of the nature of a hard pulse. When the blood-letting has greatly reduced the excitement, without removing the hardness of the pulse, the prognosis is bad. When evacuations have been pushed as far as they can be with safety, without removing this symptom, the prognosis is generally desperate. An extremely small and hard pulse, in those cases where the pulse is generally strong and full, is one of the worst symptomps, because, while it indicates the necessity of evacuations to effect a cure, it informs us that the patient can no longer bear them.

Although in the phlegmasiæ we take more blood from the full and plethoric, than from those of an opposite habit, yet, in determining the quantity, we pay less attention to the habit than in the treatment of synochus, because the blood-letting, as appears from what has just been said, is more generally requisite in the phlegmasiæ, and the consequences to be dreaded from it in these complaints are less apt to supervene, than those to be dreaded from it in idiopathic fevers.

For similar reasons, in recommending venesection in the phlegmasiæ, we pay little attention to several of the other circumstances, which were enumerated in the first volume as demanding attention in the employment of this remedy in synocha, namely, the nature of the cause from which the complaint proceeds, the season and climate, and the nature of the prevailing diseases.

Some of the circumstances alluded to however must influence the employment of blood letting in all cases. The period of the disease, and the effects of the blood-lettings which have been employed, I have already had occasion to mention; we are influenced also, as in idiopathic fevers, by the appearance of the blood which has been drawn. The age of the patient likewise demands attention; the younger he is, if not an adult, the same loss of blood will procure the greater effect. In the decline of life more is to be apprehended from venesection than at an earlier period, and then the older the patient is, it is the more dangerous.

Among the consequences to be dreaded from blood-letting in the phlegmasiæ, were mentioned its tendency to convert certain species of these into chronic complaints. In old age, when all the powers of the system become languid, this effect is particularly to be dreaded; a large proportion of old people, who are attacked with inflammation of the lungs for example, die of what has been termed peripneumonia notha, and in them acute rheumatism often degenerates into chronic, which remains during life.

Such are the circumstances which influence the employment of blood-letting in the phlegmasiæ, and if what has just been said be compared with the observations made on catharsis in idiopathic fevers, the reader will readily perceive what part of those observations is applicable to the phlegmasiæ.

In proportion as the evacuation is made more slowly by purging than by blood-letting, the discharge must be greater to produce the same diminution of the vis a tergo. Are they the less stimulating parts of the blood which are drawn off by cathartics? If so, on this account also the discharge must be the greater. We are never therefore to substitute catharsis for venesection in the phlegmasiæ; but more or less catharsis is nevertheless almost universally useful in these complaints.

Every degree of irritation in the phlegmasiæ is particularly hurtful, and even that degree which attends the healthy state of the bowels must be lessened, the fæces should be of a thinner consistence, and discharged more frequently. Besides, the body is generally costive in the phlegmasiæ, so that cathartics are doubly necessary. Although cathartics are much less effectual than blood-letting in directly diminishing the vis a tergo, yet, when they act by relieving the congestion in the inflamed part, the cause of the increased vis a tergo, their effects may be even greater than those of a moderate blood-letting; thus it is, that in all inflammatory affections of the alimentary canal, catharsis is of essential service, and were it not that we are obliged to irritate the inflamed parts, in order to procure the discharge, it is probable, that in such cases it might often be found more serviceable than venesection.

From the manner in which the vessels of the head and trunk are connected, we can hardly more effectually relieve those of the former, than by abstracting part of the contents of the latter; hence it is, that the depletion of the vessels of the head often goes so far as to produce syncope, from profuse evacuations by the bowels; hence also, we easily explain the turgescence of the vessels of the head, with the various complaints it occasions, previous to an attack of hemorrhois, and the immediate relief and pale countenance which follows the discharge from the hemorrhoidal vessels. We might therefore, a priori, venture to affirm, that in inflammations of the head a copious discharge from the intestines would be found one of the best remedies, and experience has ascertained that venesection itself is often less powerful.

In all inflammations of the head therefore, a cathartic, we shall find, is the first means we have recourse to.

With respect to the evacuation by emetics, it is less generally, though often very useful in the phlegmasiæ. It is sometimes of service by evacuating the morbid contents of the stomach, more frequently by promoting a discharge by the skin. In some of the phlegmasiæ it is otherwise serviceable, and in some it is in every case inadmissible. In inflammation of the pharynx, larynx, and trachea, for example, we shall find it one of the best of remedies; in inflammation of the encephalon, one of the most powerful means of aggravating the disease.

Diaphoretics are less generally useful in the phlegmasiæ than in idiopathic fevers, most of the phlegmasiæ, indeed, are diseases too dangerous and powerful for such feeble means. To this observation however, we shall find one or two exceptions, which deserve particular notice; and in all the phlegmasiæ proper diaphoretics aid more powerful remedies.

It has not been sufficiently attended to in the treatment of the phlegmasiæ, that evacuations are not the only means we possess of diminishing the vis a tergo. The erect posture, nausea, and certain medicines have this effect.

It is sometimes adviseable in the phlegmasiæ, when the patient is too weak to bear a considerable loss of blood, to place him in the erect posture while the blood is taken, by which a tendency to syncope will be induced by a small loss of blood, and a temporary, perhaps a permanent relief obtained. This I have heard a physician of experience say he had tried with success.

Nausea, it is evident, acts in a similar manner, and a trial of it might certainly be made with safety.

Of the medicines which have the power of diminishing the vis a tergo, one has lately demanded much attention (the Digitalis.) There have been various opinions respecting its mode of action; we shall have occasion to consider it more particularly when we speak of the complaints in which it has been employed; and it will appear, I think, that the benefit derived from it is to be attributed to its diminishing the vis a tergo. If this be the case, might not the cicuta, and other medicines possessing similar properties, be used with perhaps equal or greater advantage?

Of the Treatment of the Phlegmasiæ when the view is to procure Suppuration.

When the symptoms either do not remit on the use of proper remedies, or constantly return with the same, or greater violence, we have little hopes of procuring resolution.

In commencing the treatment of any of the phlegmasiæ, we should consider whether if we fail to procure resolution, suppuration will be desirable. If so, we must not greatly reduce the strength, because, after the excitement is reduced to a certain degree, the more the system is debilitated, the less inflammations tend to suppuration and the more to gangrene. This is one reason why in external inflammations, and in inflammations of the fauces, we do not push antiphlogistic measures so far as in inflammations of the lungs, stomach, intestines, &c. and if in the former cases antiphlogistic measures have been pushed far in hopes of procuring resolution, in order to induce a favourable suppuration, we must often have recourse to means which increase the excitement.

It is not however to be inferred, that the presence of much excitement, and a great degree of inflammation, is favourable to suppuration. Although from the very commencement of a phlegmasia we had nothing in view but to procure suppuration, we should almost always find it necessary to employ to a greater or less extent the means for promoting resolution, in order to bring down the inflammation and general excitement to that degree which is most favourable to suppuration. "As in cases of cer-
"tain effusions," Dr. Cullen observes,* "a
"suppuration is not only unavoidable but
"desirable; it may be supposed that most
"of the means of resolution formerly men-
"tioned should be avoided, and accordingly
"our practice is commonly so directed. But

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* Dr. Cullen's First Lines, paragraph 270.

" as we observe on the one hand, that a " certain degree of increased impetus, or of " the original circumstances of inflammation, is requisite to produce a proper suppuration; so it is then especially necessary " to avoid those means of resolution that " may diminish too much the force of the " circulation. And on the other hand, the " impetus of the blood, when violent, is " found to prevent the proper suppuration, " so in such cases, although a tendency to " suppuration may have begun, it may be " proper to continue those means of resolution which moderate the force of the " circulation." " On this account it is," Van Swieten* observes, " that we look " upon an increased motion of the fluids as " giving a tendency to suppuration; but it " must at the same time be remembered, " that too great a velocity of the fluids " often suddenly ruptures the vessels, and " does not procure a gradual separation of " their extremities." (It is needless, after what has been said, to make any comment on these remains of the old theories of inflammation and suppuration.) "Whence," Van Swieten continues, "a gangrene follows instead of a favourable suppuration. "A just medium therefore is requisite, we "must support the motion of the fluids, so "that they shall move more quickly than "in health, but at the same time check the "rapidity of their motion should it prove "too violent."

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* Comment. in Aph. Boerhaavii.

In short, what constitutes the chief difference between the treatment for resolution and that for suppuration is, that in the former we endeavour entirely to remove, in the latter only to moderate, the inflammation.

The same principle regulates the employment of the local means.

While the inflammation is very considerable, attended with much pain and swelling, although we have no prospect of procuring resolution, we must have recourse to the same local means which are employed for this purpose; they must not however be pushed so far. When, on the other hand, the inflammation is too languid, the local must still correspond with the general means. We must then, while by general remedies we increase the general excitement, by warm poultices and fomentations endeavour to support the inflammation.

It is a general opinion, that applications which clog the pores promote suppuration by preventing the exudation of the matter. This practice seems to have originated from the opinion of pus being formed by stagnation from some of the component parts of the blood. Such applications may be of use by increasing the heat of the part; as they always have more or less of this effect, they are improper while the inflammation runs very high. Where the inflammation is too languid, their effects are increased by a stimulating quality. The unguentum basilicum, gum ammoniac, galbanum, and opoponax have been employed for this purpose. Such applications, as well as poultices and fomentations, can only be of much service when the inflammation is external or lies near the surface,* and then the treatment

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* Fomentations are sometimes of use in visceral inflammations,

ment after suppuration rather comes under the province of the surgeon than physician.

When internal suppurations occur without immediately proving fatal, as frequently happens, the complaint comes under the care of the physician, because general rather than local means are then to be depended on. But the treatment of such suppurations is so much influenced by the nature of the part affected, that the consideration of them must be deferred till we speak of the different phlegmasiæ separately.

As an abscess increases, it is most enlarged on that side where the least resistance is opposed; when it is situated near the surface, therefore, it always points externally, and the matter is readily discharged, which in general should be done by an artificial opening rather than by waiting for the slower operations of nature, that the hectic fever, consequent on the formation of considerable abscesses, may be of as short du-

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inflammations, but we shall find that they are less serviceable in such cases than the older practitioners imagined.

ration as possible. It may thus indeed, if the sides of the abscess unite readily, be wholly prevented. But when the abscess is deeply seated, or when, as in abscesses of the lungs, the greatest resistance is opposed on the external side, they point and burst internally.

It is always of consequence therefore, in forming the prognosis, to determine on which side of an abscess the least resistance is applied, and it sometimes influences the mode of treatment, for where there is reason to apprehend that the abscess will burst internally, in some cases it is adviseable to attempt the evacuation of the matter by an external opening, although there is no appearance of pointing. This, we shall find, has often been practised with success in abscesses of some of the viscera.

The more perfect and unmixed the pus,* the more readily may we expect the abscess to heal, and the less injury will the habit sustain. It is therefore our view in promoting suppuration, to procure a pus of the most favourable kind. For answering this intention however, there are no other means than those which have been pointed out. The nearer the general excitement and the degree of the local affection approach to those best suited to promote suppuration, the more favourable will the suppuration be.

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* See what was said of pus and the discharge from foul ulcers when speaking of the terminations of inflammation.

There is one case of suppuration which demands particular attention. When gangrene supervenes, if the case terminates favourably, it is by suppuration that the dead are separated from the living parts. It appears from what has been said, that the means of preventing gangrene, are on the one hand to prevent the general excitement and inflammation from running too high, and on the other from falling too low. In short, those states which are unfavourable to resolution or suppuration, tend to gangrene. On the means of preventing gangrene therefore nothing more need be said. It remains to make a few observations on the mode of treatment after it has supervened.

Is it from the different structure and situation of internal parts, or what may have more influence, from our not being able to ascertain the presence of gangrene in such parts till it has gone a considerable length, that when symptoms denoting the presence of gangrene in any of the viscera supervene, little or nothing can be done, although we generally have it more or less in our power to check the progress of external gangrene? Whatever influence these causes may have, this difference seems chiefly owing to a circumstance which has been sufficiently illustrated in detailing the symptoms and mode of treatment of the phlegmasiæ, namely, that the whole system partakes more of the affections of internal, than external parts. The slightest visceral inflammation, it has been observed, occasions fever, and the different changes which take place in the local affection are indicated by corresponding changes in the state of the general symptoms; on the surface, on the contrary, a considerable degree of inflammation may exist and even run on to suppuration without being attended with symptoms of general derangement: so in the case of gangrene, when it is seated in external parts, the vigour of the system may still be such as to excite suppuration, and thus throw off the gangrened part; but when the gangrene is internal, the system in general partakes too much of the local affection to support this process, by which alone the progress of the gangrene may be stopped; besides, an external gangrene gradually impairs the vigour of the system, whereas the effects of an internal gangrene, owing to the strong sympathy which exists among all the more important parts of the system, are so sudden that there is hardly time for even attempting a cure. This is the less to be regretted, because the injury done by internal gangrene is generally such that a separation of the gangrened parts would only prolong the patient's sufferings.

Of gangrene of the throat and muscles it may be observed, as of inflammation of these parts, that the state of the system is neither so much affected by it as by the gangrene of more internal parts, nor so little as by that of the surface, and the prognosis is neither so bad as in the former case, nor so favourable as in the latter; farther demonstrating that the danger of gangrene is proportioned to the degree of sympathy which subsists between the system in general and the part affected.

It is only then when gangrene is seated on, or near the surface, that we can attempt the cure with any hopes of success.

The treatment may still be divided into general and local.

The general is nothing more than the mode of treatment employed in all stages of the disease when the inflammation is too languid, only in the case before us this mode of treatment is pushed to the utmost. The patient must be supported by a nourishing diet and a liberal use of wine, and the bark must be given in as large a quantity as the stomach will admit. To all this however there is one exception, when gangrene is the consequence of excessive inflammation it often appears while the general excitement runs high, and if the seat of the disease is external, the excitement sometimes continues high after the commencement

ment of the gangrene, supporting the inflammation, and thus occasioning the gangrene to spread. In such cases it is evident that any means which increase the vis a tergo must promote the progress of the gangrene. "When the gangrene arises "from the violence of inflammation," Dr. Cullen* observes, "the bark may not only "fail in proving a remedy, but may do "harm, and its power as a tonic is especially "suited to those cases of gangrene which "proceed from an original loss of tone, as "in the case of palsy and œdema; or to "those cases of inflammation where a loss "of tone takes place while the original in-"flammatory symptoms are removed."

When therefore gangrene proceeds from excess of inflammation and general excitement, we must delay the invigorating plan till the presence of the gangrene has reduced the morbid activity of the system, which soon happens, and in such cases considerable attention and nicety is often requisite, to determine the period at which the exhibition of the bark and wine should commence; so that we shall neither do injury by recalling a state of excessive excitement, nor by permitting the debility to go farther than necessary. The best rule to go by perhaps is, as soon as the excitement is reduced to the natural degree, that is, as soon as the preternatural degree of fulness, strength, and hardness has left the pulse, to exhibit small doses of bark and wine, and be regulated by their effects.

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* Dr. Cullen's First Lines, paragraph 272.

With regard to the local remedies, they are all such as tend to excite the suppuration* by which the gangrened parts are to be thrown off, the only means of removing them except that by the knife, which is the best wherever it can be employed with safety. Among the applications found serviceable are many of those termed antiseptics, and it has been a prevalent opinion, that these act by checking, by their antiseptic power, the farther tendency to gangrene.

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[*] I shall have occasion to mention a variety of these in considering the treatment of the different phlegmasiæ.

But the same substances applied to parts wholly separated from the body will not have the same effect, at least in any considerable degree, nor are the best antiseptics best fitted for checking the progress of gangrene. Besides, whatever other effect they produce, they must tend to excite the powers employed in casting off the dead parts; and as this alone accounts for their effects, there is no occasion for any other supposition.

That they may have this effect they must be applied to parts which still retain some degree of excitability; it is proper therefore, especially if the integuments remain entire, to make incisions through the gangrened part, previous to their application. Caloric is still one of the most powerful means of exciting suppuration, so that warm poultices, whatever be their composition provided they be soft and mild, are among the best applications. Some practitioners even recommend the application of warm bricks over the dressings,* and they are prepared in Holland of various shapes for this and similar purposes.

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* Van Swieten's Comment. in Aph. Boerhaavii.

In the advanced stages of gangrene, the application of heat and moisture has been deemed a more doubtful practice. The objection however appears to be founded on the same theory which ascribes so much to the antiseptic quality of the substances employed in gangrene.

The local treatment of gangrene belongs to the province of the surgeon; I shall not therefore enter into it more particularly. There is one case however which deserves notice, as particularly illustrating a principle formerly considered at some length, namely, that the body is rendered morbidly sensible to any of the natural agents by interrupting its usual application or its application in the usual degree, without becoming more sensible to the action of other agents.

When caloric is so rapidly abstracted from any part that it falls below the temperature necessary to life, like other dead animal matter, it runs to putrefaction. Thus gangrene is frequent in cold climates in those parts of the body where the circulation is most languid, the fingers, toes, nose, ears, &c.

We should, a priori, expect that gangrene from this cause would be most effectually checked by increasing the temperature of the part; and this has been confirmed by experience. Were we however at once to apply a temperature equal to the common temperature of the body, its effect would be that of spreading instead of checking the gangrene. Had not the parts in the neighbourhood of the gangrened part suffered from the application of cold, this practice might succeed; but the due degree of caloric having been for some time abstracted from these parts, the usual temperature becomes an agent sufficiently powerful* to derange the mechanism on which life depends; and as the phenomena are the same after life is destroyed, whether this be effected by too great an addition or too great an abstraction of caloric, the only effect of the sudden increase of temperature is that of making the gangrene spread.

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* See vol. i. p. 494 and 495.

The proper treatment therefore is to bring the part to the natural temperature by very slow degrees, and the first application is generally snow or iced water.

I have already had occasion to observe, that in cases of extreme debility gangrene often supervenes almost without any previous inflammation, the vis a tergo being too feeble to occasion much distension in the vessels of any part, however much debilitated. But did it happen that by any cause the vessels of a part, instead of being debilitated, which gives rise to inflammation, should be instantly deprived of all vital power in this instance, also whatever might be the state of the vis a tergo, gangrene would supervene with little or no previous inflammation. Accordingly this has sometimes though very rarely happened.*

What has been delivered may be regarded

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* A remarkable instance is related in the Philosophical Transactions for the year 1763. A poor family in Suffolk were attacked with gangrene without previous inflammation. Some died, others lost different parts, the feet, or even the legs. No probable account of the cause is given.

as nearly the sum of all that is common in the symptoms, causes, and cure of the phlegmasiæ. We are now to consider the different species separately; and notwithstanding the nature of all being the same, such we shall find is the difference arising from the function and situation of the parts affected by the inflammation, that there are hardly two diseases more different than some of these.

Different divisions of the phlegmasiæ have been proposed; that most generally adopted appears on many accounts to be the best, namely, the division according to the different organs occupied by the inflammation.

It is true indeed that the inflammation may occupy the membranous or paranchimatous part of the organ,* and we know from dissection that the inflammation is often confined to the one part or the other. No parts of the body being more different in their structure, we should be inclined, a priori, to believe, that the symptoms of such inflammations would essentially differ, and require in some respects different modes of treatment. And in most writers the reader will find this distinction made, and even different names applied to the different inflammation of the same organ. Thus they point out the symptoms which distinguish inflammations of the brain from that of its membranes, terming the one Cephalitis or Sphacelismus, and the other Phrenitis. Thus they distinguish between Pleuritis, inflammation of the pleura; and Peripneumonia, inflammation of the lungs; and so on.

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* See a paper on the Phlegmasiæ by Dr. C. Smith, in the 2d vol. of the London Medical Communications.

In paranchimatous inflammation, it is said, as the parts are soft and yield readily, the pain is never so acute nor the fever so violent as in membranous inflammation, where from the parts yielding with more difficulty the symptoms are necessarily more severe.

This hypothesis seemed confirmed, when it was observed that in most visceral inflammations the symptoms are sometimes of the one kind, sometimes of the other. The opinion therefore was implicitly received,

ceived, till Sauvages, Linnæus, and others, whom I shall hereafter have occasion to mention, made dissections in order to ascertain its validity. The result was so far from being such as was expected, that the membranes were often found inflamed where there had been only symptoms of paranchimatous inflammation, and the paranchima was found inflamed where the symptoms had been those of membranous inflammation. Nay we shall find, when we consider the cases in which the distinction has been chiefly insisted upon, that where symptoms of paranchimatous inflammation alone have been present, the membranes alone have been found affected, and vice versa. In short, from these dissections it appears that there are no symptoms by which we can distinguish the paranchimatous and membranous inflammations of any organ, nor is this to be regretted, since experience has proved the practice to be precisely the same in both cases. We can, for the most part, readily determine what organ is affected by the inflammation, and as this knowledge is all that is necessary for conducting the treatment of the complaint, we need not be solicitous for more.

It is unnecessary then to look for a more minute division of the phlegmasiæ than that adopted by Dr. Cullen, who, with a few exceptions afterwards to be pointed out, considers the inflammation of each organ a different disease, and arranges the whole under the three heads of *Cutaneous*, *Visceral*, and *Articular*.

CHAP. IV.

Of the Phlegmon.

IT was observed when speaking of simple inflammation, that there are but two species which can be well defined, the others appearing to be only varieties of these. The same observation applies to the cutaneous phlegmasiæ; the two species of which are termed by Dr. Cullen Phlegmon and Erythema, forming the seventh genus in his system of nosology, which he calls Phlogosis, and defines,

"Pyrexia, partis externæ rubor, calor, et
"tensio dolens."

The first species of this genus, the Phlegmon, he defines,

"Phlogosis rubore vivido; tumore cir-
"cumscripto, in fastigium plerumque ele-
"vato, sæpe in apostema abeunte; dolore
"sæpe pulsatili."

The Erythema is defined,

"Phlogosis colore rubicundo, pressione
"evanescente; ambitu inæquali, serpente;
"tumore vix evidente, in cuticulæ squamu-
"las, in phlyctænas vel vesiculas abeunte;
"dolore urente."

Dr. Cullen, in his definition of phlogosis, (by which we are to understand an external + inflammation causing fever) omits one of the characteristic symptoms of inflammation, the swelling. This is the consequence of the same inaccurate use of the term phlogosis, considered at length in the Introduction. Although pyrexia is the first word in the definition of phlogosis, (Dr. Cullen in this, as in other instances, being induced in order to defend his mode of arrangement, to give the phlegmasiæ as much as possible the appearance of idiopathic fevers) notwithstanding, I say, pyrexia is the first word in Dr. Cullen's definition of phlogosis, yet he uses the term to express all species of cutaneous inflammations whether accompanied by fever or not, as appears both from there being no other place in his system of nosology for cutaneous inflammation unattended by fever, and from the manner in which he uses the term phlogosis in his definitions of the exanthemata and phlegmasiæ*

Strictly speaking then, the term phlogosis as used by Dr. Cullen, although he arranges under it only two species, includes four, two of which Dr. Cullen's mode of arrangement obliged him wholly to overlook. It not only includes the two phlegmasiæ the definitions of which have just been given, but it includes also the two species of simple inflammation considered in the Introduction to this part.

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* Introduction, vol. i. p. 11 and 12.

This Dr. Cullen was well aware of, and as far as his system admitted of it, he formed his definition of phlogosis accordingly. Why, it may be asked, is swelling excluded from the definition of phlogosis when it is mentioned in the definitions of the only two species arranged under it? The reason is, because, although the swelling is always sufficiently evident in those external inflammations which cause fever, in one species of simple inflammation, (the erythema) we have seen, it is often so slight as not to be observable.

Notwithstanding this, I have admitted tumor into the definition of simple inflammation, because although it is not always observable, yet it appears from what was said of the nature of inflammation, that it must always in some degree attend it, and in the above experiments, where it could not be discovered by the naked eye, it was always evident with the assistance of the microscope. But of the cutaneous *phlegmasiæ*, where the swelling is at all times so evident, it ought certainly to make part of the definition.

As there does not appear however to be any occasion for a generic name for the cutaneous phlegmasiæ, the two species being complaints nearly as different as almost any two of the phlegmasiæ, and in reality, although both external, not having their seat in the same parts, I shall abandon both the term phlogosis* and its definition. Were there no other reason for abandoning this term, the inaccurate manner in which it is used by Dr. Cullen, and by others who have adopted it from him, would be a sufficient one.

The phlegmon, Dr. Cullen's first species of phlogosis, then is, according to the arrangement I have adopted, the first species of the phlegmasiæ, and is therefore to be considered here. Of all the phlegmasiæ this is the least important, its symptoms are least varied, and its prognosis is most favourable. The only alteration I would propose on Dr. Cullen's definition of the phlegmon is merely to adapt it to the mode of arrangement I follow. It may be defined,

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* That Dr. Cullen was aware that his use of this term was not altogether accurate, appears from the following note. "Pro nomine generis cujus species est "erythema minus recte in priore editione usurpatum "fuit Phlegmone. Novum nomen necessarium nobis "videbatur, et *nihil aptius* quam Phlogosis suppete"bat." Synopsis Nosologiæ Method. v. ii. p. 83.

"Phlegmasia, rubore externo vivido; tu-
"more circumscripto, in fastigium plerum-
"que elevato, sæpe in apostema abeunte;
"dolore sæpe pulsatili."

SECT. I.

Of the Symptoms of Phlegmon.

IT has already been remarked that the phlegmon does not differ from the pustule except in its being larger, the inflammation running higher, and frequently occasioning fever. What has been said of the pustule therefore, together with the definition of the phlegmon just given, comprehends all that need be said of the symptoms of the latter.

The phlegmon, in short, is a circumscribed red swelling rising to a point or nearly to a point, attended with a considerable degree of pain and a sense of distension and throbbing. The fever generally supervenes some time after the local affection, for the most part not till the latter has become considerable, and is always proportioned to it. The phlegmon rarely terminates by resolution, more rarely by gangrene, and the suppuration is generally of a favourable kind.

Dr. M'Bride* regards the phlegmon and boil as different, but the diagnosis which he proposes is too imperfect to afford grounds for such a distinction. When an inflammation is circumscribed, he observes, and deeply seated in the vessels of some fleshy part, the term for the disease is phlegmon. The furunculus or boil is an inflamed swelling more circumscribed and pointed than the phlegmon, very hard and painful, arising indifferently on all parts of the body.

Dr. Cullen regards this, as well as many of the other species admitted by authors, which it is needless to spend time in pointing out, merely as varieties of the phlegmon, which differs a little in its form on the same parts, and still more on different parts of the body. It may be doubted indeed of some of his varieties* whether they are properly arranged under phlegmon, but these varieties coming under the province of the surgeon, it is not our business to consider them here. Many of these complaints evidently belong to the locales.

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* Introduction to the Theory and Practice of Medicine.

SECT. II.

Of the Causes of Phlegmon.

OF the causes of phlegmon there is little or nothing to be said in addition to what was said of those of the phlegmasiæ in general. In plethoric and vigorous habits its exciting causes are often so slight as to escape attention.

The chief seat of the phlegmon and pustule is the inner surface of the true skin and the cellular substance contiguous with it, from which it extends to the adjoining parts of the cellular membrane and skin, so that the

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[*] Culleni Synopsis Nosologiæ Method. v. ii, p. 84.

the surface generally soon assumes a florid colour, the tumor at the same time extending both in depth and circumference.

SECT. III.

Of the Treatment of Phlegmon.

ON this part of the subject also there is little more to be done than to refer to what has been said of the phlegmasiæ in general. We may attempt the cure of phlegmon by resolution. As this mode of treatment however would generally be tedious, and after all that could be done would often fail to produce the desired effect, as suppuration in the phlegmon properly so called, is always of a favourable kind, and lastly, as some cases of phlegmon, (those proceeding from extraneous matters introduced into, and irritating the skin) whatever relief be obtained by resolvents, must at length terminate by suppuration, it is upon the whole found the best plan from the first to promote this termination.

Both on this account and because the fever is seldom considerable, the more powerful antiphlogistic measures, particularly blood-letting, in most cases make no part of the treatment. It is sufficient that the fever be kept moderate by rest, dilution, and gentle laxatives.

With respect to the local treatment, if the inflammation run very high, it must be diminished by local blood-letting or by a blister applied to some neighbouring part, by which the congestion will be relieved, and by the latter, in consequence of the sympathy of parts, the inflamed vessels also excited to action: which may be farther done by diminishing the increase of temperature in the part, which tends farther to relax, by the repeated application of wet clothes, the effects of which are increased by dissolving in the water, nitre, sugar of lead, or other refrigerants.

When the inflammation does not run high, no local application is necessary, till, from the diminution of the pain and increase of the throbbing, there is reason to believe that suppuration has commenced, which is to be promoted by warm poultices and emollient fomentations. The matter should be discharged as soon as it is completely formed, and if the wound does not heal readily, the tonic plan is proper and should be continued till the patient is restored to health.

In some of Dr. Cullen's species of phlegmon, phymosis, paraphymosis, &c. other means are occasionally necessary, but for these I must refer to the works on surgery.

CHAP. V.

Of Erysipelas.

AS the erysipelas has been regarded as an exanthema, it has already fallen under our notice. It appears from what was said in the 154th and following pages of the second volume, that I use the term erysipelas in the same sense in which Dr. Cullen uses phlogosis erythema, his definition of which is given above.

Such is the confusion of terms in this part of medicine, that there are no less than three different affections, each of which has been known by the same appellations, and for each of which at least two appellations have been used indiscriminately. Before we can speak of these diseases, it is necessary at least to know the meaning of the terms we employ. A chronic inflammation of the skin never occasioning fever, is termed by some writers erythema, by some erysipelas, by some the terms are used indiscriminately. The same terms have been applied with as little discrimination to another inflammation of the skin which is always a febrile disease, but which forms a complaint of a very different nature when complicated with simple fever; to which combination, however, the same terms erysipelas and erythema have been applied.

Dr. Cullen employs the term erythema to express the inflammation occasioning fever. By the term erysipelas he expresses the combination of the erythema and simple fever; and with respect to the simple inflammation,

mation, as there is no place for it in his system of nosology, he gives it no name.

In the passage just alluded to, I have pointed out the inconveniencies resulting from this arrangement, and offered my reasons for using the terms in a different acceptation. The simple diffuse inflammation of the skin I have termed erythema; the phlegmasia, the diffuse inflammation of the skin occasioning fevers, I have termed erysipelas; and with respect to the combination of erysipelas and simple fever, there is no more reason for giving it a name, than for giving a name to any other combination of two complaints.

The complaint I am now to consider then is the phlogosis erythema of Dr. Cullen, to which I confine the name of erysipelas. Dr. Cullen's definition of this complaint requires no other alteration than what is necessary to adapt it to the mode of arrangement followed in this treatise. The erysipelas may therefore be defined,

Phlegmasia rubore externo, pressione evanescente; ambitu inæquali, serpente; tumore vix evidente, in cuticulæ squamulas, in phlyctænas vel vesiculas abeunte; dolore urente. *

SECT. I.

Of the Symptoms of Erysipelas.

AS the combination of erysipelas and simple fever has been so generally regarded as an exanthema, and so constantly confounded with erysipelas according to the above use of the term, I found it necessary in considering eruptive fevers to treat of what has been termed the erysipelatous. In considering the nature of this fever, it was necessary to enter particularly into the symptoms of erysipelas. For this part of the subject therefore I must refer the reader to the second volume.

From what is there said, he will find that the erysipelas bears the same resemblance to the simple inflammation termed erythema, which the phlegmon does to that termed pustule. The only difference in both cases being, that in the phlegmasia the inflammation is generally of greater extent, its symptoms run higher, and it is attended with fever.

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* This definition does not include all the varieties enumerated by Dr. Cullen, some of which are merely local diseases.

Such then are the four species of cuticular inflammation, the pustule and erythema which are merely local affections, the phlegmon and erysipelas which are febrile diseases.

SECT. II.

Of the Causes of Erysipelas.

IN determining the nature of the erysipelatous fever, it was necessary to consider the causes, as well as the symptoms, of erysipelas. For these also, therefore, I must refer the reader to the second volume; he will there find that erysipelas arises from all the causes of the phlegmasiæ in general, and also from certain causes which affect the state of the skin, particularly derangement

ment of the primæ viæ. Like the other phlegmasiæ, by leaving the part in a state of debility, it leaves behind it a predisposition to future attacks.

The chief seat of the erysipelas and erythema is the outer surface of the true skin and the corpus mucosum, but the former often spreads through the skin and affects the cellular substance beneath it.

Although it was necessary, in order to place the nature of the erysipelatous fever in a clear point of view, to enter fully into the symptoms and causes of erysipelas, the treatment could not be laid before the reader till he was made acquainted with the principles on which the treatment of the phlegmasiæ is founded. On this part of the subject therefore I am now to enter.

SECT. III.

Of the Treatment of Erysipelas.

THE treatment of the different phlegmasiæ having much in common, it appeared the most concise plan to lay before the reader, previous to entering on the different species, the plan of treatment which may be regarded as common to them all, so that in considering the treatment of each separately, it will only be necessary to point out what is peculiar to it.

What is peculiar in the treatment of erysipelas depends chiefly on the seat of the inflammation being external.

It was observed of the phlegmasiæ in general, that the symptoms are more moderate, the prognosis better, and consequently the means required less vigorous, the more external the seat of the inflammation. On this account, in most cases of erysipelas, we do not find it necessary to have recourse to very vigorous antiphlogistic measures; a cooling diet, an emetic at the commencement, and gentle saline laxatives, repeated so as to support a moderate catharsis, are generally sufficient, especially if the inflammation is confined to the extremities.

When the fever is considerable, diaphoretics, particularly antimonials should be exhibited. In this case the best plan appears to be, after the operation of a gentle emetic, to give one or two brisk saline cathartics according to the urgency of the symptoms, and then support a moderate catharsis by antimonials.

If the antimonials occasion sweating, they may fail to move the bowels. In this case we must be cautious not to check the sweating, (a frequent crisis in erysipelas*) which might be done by attempting to induce catharsis. While the sweating continues, therefore, the alvine discharge should be solicited only by emollient clysters repeated once, or at most twice, in the day.

The propriety of attempting the cure of erysipelas rather by catharsis than by blood-letting farther appears from the evident connection between erysipelas and the state of the primæ viæ, which was considered at length when speaking of the symptoms and causes of this complaint. Irritation of the stomach and bowels, we found, not only increases all the symptoms, but seems very frequently to be the exciting cause of erysipelas, so that a cathartic will often have a greater effect in removing it than any loss of blood which the patient can sustain.

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* See vol. ii.

Notwithstanding what has been said, however, venesection* is still the best means of diminishing excessive excitement when we have, as far as lies in our power, removed the causes which support it, and although in erysipelas a brisk cathartic, by removing the cause which produced or tends to support the complaint, will often have a greater effect than even copious blood-letting, yet if the first or second cathartic fail, a moderate venesection will have a much better effect than the continued repetition of powerful cathartics.

It is also to be observed, that although as the inflammation is external we do not cet. parib. push antiphlogistic measures so far as in many other of the phlegmasiæ, yet as our view in erysipelas always is to procure resolution, erysipelas having little tendency to suppuration except when it spreads deep, and suppuration, when it does occur in this complaint, being generally unfavourable, antiphlogistic measures should be carried farther than in the phlegmon.

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* See the observations on the modus operandi of venesection, in the first volume.

While we endeavour to procure resolution, however, we must not forget the tendency of erysipelas to gangrene. If the habit is good indeed, any tendency to this which may appear is generally slight, and attended with little danger; but in debilitated habits, and particularly in those advanced in life, the gangrene, we have seen, is apt to spread deep, and often proves fatal. In such cases therefore much caution is requisite.

What has been said of the treatment of erysipelas is rather applicable to that of the trunk and limbs than of the face. When neither coma nor delirium attends the latter indeed, which is not often the case, its treatment is the same as in erysipelas of other parts, with these differences, that on account of its tendency to affect the brain, the antiphlogistic means should be more powerful in proportion to the symptoms, and, as the seat of the inflammation is in the head, more is to be expected from catharsis* after the removal of irritating matter from the primæ viæ, than in erysipelas of the trunk and extremities.

But when coma or delirium is present, the inflammation of the face is the least important part of the complaint. There is then always reason to believe, that the inflammation has attacked the brain,† and experience has pointed out that the treatment in such cases is the same as in phrenitis, the disease we are next to consider.

In laying down the treatment of the phlegmasiæ, I passed over in silence the employment of opium in these complaints, which by some has been warmly recommended, because as there is much difference of opinion on this subject, it seemed better to defer any observations on it, till we came to consider the particular cases in which it has been recommended.

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* See the observations on catharsis in inflammations of the head, in the chapter on the treatment of the phlegmasiæ in general.

† See what is said on this part of the subject, in the section on the symptoms of erysipelas, in the second

The indication in all the phlegmasiæ, we have seen, is to restore the proper balance of power between the vessels of the inflamed part and the vis a tergo. Now as in active inflammation, the vis a tergo is generally too powerful, especially if resolution is the termination we have in view, and as opium, for sometime after it is received into the system, increases the force* of the circulation, we should, a priori, believe, that in most cases of the phlegmasiæ, it would be found pernicious. But as the vis a tergo, on the other hand, is often in a great measure supported by the pain and irritation of the local affection, opium, by allaying these, might even be the means of diminishing the vis a tergo. It appears from these observations, then, that the effects of opium in the phlegmasiæ are most to be dreaded where the vis a tergo, which is best measured by the hardness of the

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[*] See Dr. Crump's experiments on the pulse in his Treatise on Opium, and a variety of other observations on this subject.

pulse,* is, cet. paribus, greatest, and most benefit is to be expected from this medicine where the pain and irritation are proportionably most considerable. At the commencement of the phlegmasiæ, before the mass of blood has been lessened, the same cause will produce a greater increase of the vis a tergo than after the contents of the vessels have been diminished, then the pain and irritation often bearing a greater proportion to the vis a tergo, we may attempt allaying them at the risk of some temporary increase of the vis a tergo.

If we examine the result of experience in this part of the treatment, we shall find it coinciding with these observations. At the commencement of the phlegmasiæ before evacuations have been made, opium is found hurtful, but after we have reduced the vis a tergo, if the pain and irritation still remain considerable, it is generally attended with advantage to allay them by anodynes cautiously administered. I have repeatedly known them employed in this way with advantage, and, from what I have observed, I cannot help warmly dissenting from those who would strike opiates from the catalogue of medicines in the phlegmasiæ, or only employ them to procure sleep after almost every symptom has disappeared. It would appear, I think, that the use of opium may with much advantage be greatly extended in the practice both of medicine and surgery.*

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* See what was said of a hard pulse, in the section on the symptoms of the phlegmasiæ. While the pulse is hard the blood is always propelled into the vessels of the inflamed part with a force greater than in due proportion to their strength, however great the general debility may be.

It is also to be observed, that the temporary increase of vis a tergo occasioned by opium will be the less injurious in the phlegmasiæ, the less important the seat of the inflammation, and the less suppuration and gangrene are to be dreaded. Hence we may employ opium earlier in external than internal inflammations. We often see a complaint so trifling as a suppuration in the finger occasion sleepless nights and a considerable degree of fever, both of which may be prevented by a moderate dose of opium.

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* Why may not a dose of opium be given previous to operations, since many surgeons give it liberally and with the best effects immediately after them? To what extent might such a practice be carried? It is surely worth while to endeavour by experiments, which might in the first instance be made on brute animals, to ascertain this point.

In erysipelas of the trunk and limbs then, after the vis a tergo is to a certain degree reduced, opium, with proper means to prevent its constipating effects, is a valuable medicine.*

In erysipelas of the face, even without coma or delirium, from the tendency of this form of the disease to affect the brain, opium is a more doubtful remedy. For its exhibition in cases attended with coma or delirium I may refer to what is about to be said of inflammation of the brain.

Concerning the local remedies employed in erysipelas there is much difference of opinion. "As in this disease," Dr. Cullen observes, "there is always an external affec- " tion, and as in many instances there is no " other; so various external applications " to the part affected have been proposed; " but almost all of them are of doubtful " effect. The narcotic, refrigerant, and " astringent applications are suspected of " disposing to gangrene; spirituous appli- " cations seem to increase the inflammation, " and all oily or watry applications seem to " occasion its spreading. The application " which seems most safe and which is now " most commonly employed is that of a dry " mealy powder frequently sprinkled on the " inflamed parts." Many however, particularly foreign writers, are of a different opinion. Quarin,* Vogel,* and others dissuade indeed from solutions of lead, once much employed, and resinous and oily applications which they think tend to induce gangrene,‡ but they warmly recommend mild vegetable decoctions, particularly that of elder flowers in milk. Quarin even condemns all dry applications. Most of the external applications recommended in erysipelas, Burserius observes, if not hurtful are useless; he however advises the part to be kept moist with mild decoctions of marshmallows, &c. or with tepid milk. It is not improbable, I think, that as the erysipelas of different countries is found to differ in several respects, namely, its tendency to gangrene, to be accompanied by typhus, to attack particular parts of the body, &c. the same applications will not in every country be found the best. Most British practitioners agree with Dr. Cullen that a dry mealy powder is the best application; I have always seen it attended with good effects.

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* A correspondent of Dr. Duncan observes, in the 12th volume of the Medical Commentaries, "In the "common erysipelatous inflammation of the skin with "a fever preceding and attending it, I in all cases use "opium in the the quantity of from a quarter of a "grain to half a grain every 4 or 6 hours."

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* De Febribus. † De Cog. et Cur. Morb.

‡ If erysipelas of the breast, Quarin observes, be treated with irritating applications, it often terminates in schirrus and even cancer.

When the part is very tense, and there is reason to dread gangrene, Burserius recommends making incisions. These are also necessary when the inflammation has spread deep and a collection of matter is formed under the cutis vera.* When vesicles arise,

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* Vogel de Cog. et Cur. Morb.

Quarin advises them to be opened, that the acrid matter may not erode the parts beneath; the propriety of this practice may be questioned.

Such is the mode of treatment in the more common forms of erysipelas. The malignant erysipelas and the erysipelas infantum are the only forms of the disease to which the foregoing observations are not applicable.

I have already had occasion to make some observations on the treatment of erysipelas supervening on typhus, and it appears from the observations of Burserius, Quarin, and other foreign writers, that the treatment of malignant erysipelas properly so called, is the same.

Burserius chiefly relies on the bark, Virginian snakeroot, camphire, and the sulphuric acid. To these Quarin adds scordium, and what we may venture to pronounce, next to the bark the most valuable of all, wine. In malignant erysipelas however, the typhus is not always present from the beginning. It is therefore necessary where this form of the disease is known, to proceed with much caution at the commencement, and not push antiphlogistic measures farther than the state of the symptoms absolutely requires. What was said of the treatment in those idiopathic fevers which are apt suddenly to assume the form of typhus is with little change applicable here.

Anomalous cases occur in this as in almost all other diseases. We sometimes meet with cases of erysipelas attended with little general excitement, particularly the habitual erysipelas, in which, although there is no tendency to gangrene, the tonic plan proves most successful. Thus in the 16th volume of Dr. Duncan's Medical Commentaries the reader will find a case of erysipelas of the hands where the fever was slight, which was repeatedly removed by a free use of wine.

The erysipelas infantum is a form of the complaint which has not till lately demanded much attention. Hoffman seems to be the earliest writer who describes it. It has since been treated of by several writers, particularly by Dr. Underwood in his Treatise on the Diseases of Children, and by Dr. Bromfield and Dr. Garthshore in the second volume of the Medical Communications.

The tendency of the erysipelas infantum to gangrene pointed out the bark, and its effects seem fully to have answered expectation. There is no disease, Dr. Garthshore observes, in which the bark is more evidently beneficial. When it cannot be taken in sufficient quantity by the mouth, it must be given in clysters. To this medicine, with the addition of local applications, practitioners seem wholly to have trusted.

With regard to the local applications, farinaceous powders have been less employed in this than in other forms of erysipelas. They are not even mentioned by those who have been most conversant with the disease.

Dr. Bromfield recommends fomentations, spirituous embrocation, and emollient cataplasms. Dr. Garthshore also observes that he has found these applications beneficial. He recommends saturnine ointment and poultices. Saturnine poultices, he observes, generally removed the inflammation without the aid of the bark, but removed in this way from one part, it always attacked another; at length, however, he trusted the cure wholly to the bark, and the common fomentation with a little soap dissolved in it; and thought that saturnine applications were upon the whole prejudicial.

In the treatment of erysipelas infantum, as in all other forms of the disease, much attention should be paid to the state of the bowels. Clearing the primæ viæ should always make the first part of the treatment. The erysipelas infantum has, with much probability, been ascribed to some fault in the milk; and it is asserted that the nurse's indulging in the use of spirituous liquors is often sufficient to occasion it.

I shall finish the account of erysipelas with the following observations of Tissot, respecting the means of preventing its return. Those subject to returns of erysipelas, he observes, should carefully avoid the use of milk,* cream, and all rich and viscid aliment, baked and strong meats, aromatics, strong wines, a sedentary life, strong affections of the mind, above all, rage, and, if possible, chagrin. Those who are subject to erysipelas should live chiefly on herbs, fruits, and other articles slightly acescent. They should drink water and some of the light white wines, and, above all, make frequent use of cream of tartar.

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* With respect to the use of milk it can only be prejudicial when it requires digestion. This indeed may

These precautions, he adds, are of the greater importance, because not to mention the danger from frequent returns of erysipelas, they denote slight affections of the liver or gall-bladder,* which, when neglected, often become serious.

CHAP. VI.

Of Phrenitis.

WERE it not that dissection has ascertained phrenitis to be an inflammation of the brain, there is hardly any thing in the

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may be observed of all bland articles of diet. What-ever hurts the digestion is injurious. See what was said of dyspepsia, in the 1st vol. b. i, ch. v, sect. 1.

* See the 2d vol. page 162.

symptoms which would have led the practitioner to distinguish it from an idiopathic fever. I have already had occasion to observe, that phrenitis differs from the other phlegmasiæ. The symptoms denoting the local affection are such as very frequently attend idiopathic fevers; contrary to what happens in the other phlegmasiæ, it is generally accompanied with coma or delirium, and the excitement often runs as high, as in the most strongly marked synocha.

The causes of these peculiarities the reader will readily perceive. Simple fever consists in a general affection of the sanguiferous and nervous systems; to these in the phlegmasiæ are superadded certain local symptoms, pain, and the derangement of some of the functions. But when the inflammation is seated in the brain, on which sensation and motion in every part of the system depend, the symptoms of the local affection are not local, but general, symptoms. Hence the difficulty of finding a diagnosis between phrenitis and idiopathic fevers, which is farther increased by the latter, in the way above pointed out, often becoming a real phrenitis.

Whenever the velocity of the circulation is much increased, indeed, from the nature of the circulation in the head, there must always be a tendency to this complaint, or to congestion in the larger vessels. Hence head-ach, suffusion of face, inflammation of the eyes, bleeding from the nose, and other symptoms denoting preternatural distention of the vessels of the head, are among the most frequent symptoms of synocha.

Phrenitis is the third genus of Dr. Cullen's phlegmasiæ. The only alteration, which will be necessary on his definition, will be to adapt it to the mode of arrangement which I follow.

Phlegmasia dolore capitis, rubore faciei et oculorum, lucis et soni intolerantia, pervigilio, dilirio feroce vel typhomania.

I have already had occasion to allude to the division of this complaint into phrenitis, and cephalitis or sphacelismus. After what has been said, it is only necessary to observe here, that as we proceed in considering the symptoms, I shall point out those which characterise these different forms. The reader must recollect however, that different as these forms are, they do not point out the seat of the complaint to be different. The membranous or paranchimatous inflammation may be attended with either set of symptoms.

With regard to the circumstance which determines the complaint to assume the one form or the other, on comparing what has been said of the nature of inflammation with the symptoms of phrenitis, we shall have reason, I think, to believe, that phrenitis, properly so called, is the only real inflammation of the brain. The cephalitis or sphacelismus being merely a congestion in the larger vessels, and not essentially differing from apoplexy.

In all parts of the body a congestion in the larger vessels occasions comparatively little pain, little increase of temperature, and little fever. In short, the symptoms it occasions are precisely those of cephalitis, with the exception, that in this case the symptoms of oppressed brain are superadded

In inflammation, that is, congestion in the capillaries, the pain is acute, and the increase of temperature and fever considerable.

This distinction will be found to account for many of the anomalous appearances referred to the phlegmasiæ, for dissectors have not accurately distinguished between congestion of the larger vessels and inflammation. Hence, in all probability, it is that we hear of inflammation of the stomach, bowels, &c. proving fatal without having been attended with either pain or fever.*

SECT. I.

Of the Symptoms of Phrenitis.

PHRENITIS often makes it attack with a sense of fullness in the head, flushing of the countenance, and redness of the eyes, the pulse being full, but in other respects natural. As these symptoms increase, the patient becomes restless, his sleep is disturbed or wholly forsakes him.

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* See what was said of the anomalous appearances of the phlegmasiæ, towards the end of the first chapter of this book.

It sometimes comes on, as in the epidemic of which Saalman * gives an account, with pain, or a peculiar sense of uneasiness of the head, back, loins, and joints; in some cases with tremors of the limbs, and intolerable pains of the hands, feet, and legs. It now and then attacks with stupor and rigidity of the whole body; sometimes with anxiety, and a sense of tension referred to the breast, often accompanied with palpitation of the heart. Sometimes nausea and a painful sense of weight in the stomach are among the earliest symptoms. In other cases the patient is attacked with vomiting, or complains of the heart-burn, and griping pains in the bowels.

When the reader reflects on the intimate connection which subsists between the brain and every part of the system, he will not be surprised to find the symptoms at-

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* Saalman's Observations on Phrenitis, in the Acta Erudit. Lipsiensia.

tending the commencement of phrenitis so various, and that the stomach in particular should suffer, which so remarkably sympathises with the brain. These symptoms assist in forming the diagnosis between phrenitis and synocha.

The pain of the head soon becomes more considerable, and sometimes very acute. "If the meninges," says Dr. Fordyce,* "are affected, the pain is acute; if the "substance only, obtuse and sometimes "but just sensible." And Dr. Cullen remarks, "I am here, as in other analogous "cases, of opinion, that the symptoms "above mentioned of an acute inflamma-"tion, always mark inflammations of "membranous parts, and that an inflam-"mation of paranchima or substance of "viscera exhibits, at least commonly, a more "chronic inflammation."

It is unnecessary here to make any farther observations on this part of the subject. When we consider pneumonia, in which complaint the distinction has been chiefly insisted upon, and is still very generally admitted, I shall have occcasion to enter upon it at great length.

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* Dr. Fordyce's Practice of Medicine.

The seat of the pain is various, sometimes it seems to occupy the whole head; sometimes, although more circumscribed, it is deep-seated and ill-defined. In other cases it is felt principally in the forehead or occiput. The redness of the face and eyes generally increases with the pain, and there is often a sense of heat and throbbing in the head, the countenance acquiring a peculiar fierceness.

These symptoms for the most part do not last long before the patient begins to talk incoherently, and to shew other marks of delirium. Sometimes however, Saalman observes, delirium did not come on till the fifth, sixth, or seventh day.

The delirium gradually increases till it often arrives at a state of phrenzy. The face becomes turgid, the eyes stare, and seem as if starting from their sockets, tears and sometimes even blood* flowing from them; the patient in many cases resembling a furious maniac, from whom it is often impossible to distinguish him, except by the shorter duration of his complaint.

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* Observations of Saalman,

The delirium assists in distinguishing phrenitis and synocha,* as it is not a common symptom in the latter. When delirium does attend synocha, however, it is of the same kind as in phrenitis.

We should, a priori, expect in phrenitis considerable derangement in the different organs of sense, which so immediately depend on the state of the brain. The eyes are incapable of bearing the light, and false vision, particularly that termed muscæ volitantes,† and flashes of light seeming to dart before the eyes, are frequent symptoms.

The hearing is often so acute, that the least noise is intolerable; sometimes, on the other hand, the patient becomes deaf,

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[*] See Lobb's Practice of Medicine.

[†] It seems to be owing to this deception of the sight that the patient is often observed to pick the bed-clothes. This, however, I have observed, he often does without directing his eyes to the bed-clothes, or indeed particularly to any object.

and the deafness, Saalman observes, and morbid acuteness of hearing sometimes alternate. Affections of the smell, taste, and touch, are less observable.

As the organs of sense are not frequently deranged in synocha,* the foregoing symptoms farther assist the diagnosis between this complaint and phrenitis.

The pulse is not always so much disturbed at an early period, as we should expect from the violence of the other symptoms compared with what we observe in idiopathic fevers. When this circumstance is distinctly marked, it forms perhaps the best diagnosis between phrenitis and synocha, and gives to phrenitis more of the appearance of mania. "Interea exurgit febris "nunc levis nunc intensa, nec semper morbi "impetui consona, adeo ut sola diuturnitate "discrepare videatur hoc delirii genus a "mania, quam contumaciorem esse nemo "nescit."†

In many cases however, the fever runs

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* Vol. i, p. 324.

† Lieutaud's Synopsis Med. Pract. Sect. de Phrenitide.

as high as the delirium, then the case often almost exactly resembles a case of violent synocha; from which it is the more difficult to distinguish it if the pulse be full and strong. In general, however, the hardness is more remarkable than in synocha, and in many cases the pulse is small and hard, which may be regarded as one of the best diagnostics between the two complaints, the pulse in synocha being always strong and full. In phrenitis it is sometimes, though rarely, intermitting.

The respiration is generally deep and slow, sometimes difficult, now and then interrupted with hickup, seldom hurried and frequent, a very unfavourable symptom. In many of the cases mentioned by Saalman, pneumonia supervened.

The deglutition is often difficult, sometimes convulsive. The stomach is frequently oppressed with bile, which is an unfavourable symptom; and complete jaundice, the urine and skin being tinged yellow, sometimes supervenes. Worms in the stomach and bowels are also frequent attendants on phrenitis, and there is reason to believe, may have a share in producing it. The hydrocephalus internus, which is more allied to phrenitis* than dropsy of the brain properly so called, seems often in part at least to arise from derangement of the primæ viæ, particularly from worms. We cannot otherwise, I think, account for the frequent concurrence of these complaints. As we proceed in considering the different phlegmasiæ, we shall find that there are few to which derangement of the abdominal viscera do not give some predisposition.

Instead of a superabundance of bile in the primæ viæ, there is sometimes a deficiency of it, which seems to afford even a worse prognosis. The fæces alvinæ being of a white colour, and a black cloud in the urine are regarded by Lobb† as fatal symptoms. The black cloud in the urine is owing to an admixture of blood; when unmixed with blood the urine is generally pale.

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* See what is said in the next section on the appearances on dissection in phrenitis.

† Lobb's Practice of Physic.

There is often a remarkable tendency to the worst species of hemorrhagies towards the fatal termination of phrenitis. Hemorrhagy from the eyes has already been mentioned. Hemorrhagy from the intestines also, tinging the stools with a black colour, is not uncommon. These hemorrhagies are never favourable; but the hemorrhagies characteristic of synocha, particularly that from the nose, sometimes occur at an earlier period, and, if copious, generally bring relief. More frequently, however, blood drops slowly from the nose, demonstrating the violence of the disease without relieving it. In other cases there is a discharge of thin mucus from the nose.

Tremors of the joints, convulsions of the muscles of the face, grinding of the teeth, the face from being florid suddenly becoming pale, involuntary tears, a mucous discharge from the nose, the urine being of a dark red or yellow colour or black, or covered with a pellicle, the fæces being either bilious or white and very fœtid, profuse sweat of the head, neck, and shoulders, paralysis of the tongue, general convulsions, much derangement of the internal functions, and the symptoms of other visceral inflammations, particularly of pneumonia, supervening, are enumerated by Saalman as affording the most unfavourable prognosis.' The delirium changing to coma, the pulse at the same time becoming weak, and the deglutition difficult, was generally the forerunner of death.

When, on the contrary, there is a copious hemorrhagy from the hemorrhoidal vessels, from the lungs, mouth, or even from the urinary passages, when the delirium is relieved by sleep, and the patient remembers his dreams, when the sweats are free and general, the deafness is diminished or removed, and the febrile symptoms become milder, there are hopes of recovery.

In almost all diseases, if we except those which kill suddenly, as the fatal termination approaches, nearly the same train of symptoms supervenes, viz. those denoting extreme debility of all the functions. These the reader will find enumerated at length in the first volume; it is unnecessary to repeat them here.

Saalman remarks that the blood did not always shew the buffy coat.

Phrenitis, like most other complaints, has sometimes assumed an intermitting form, the fits coming on daily, sometimes every second day.*

When phrenitis terminates favourably, the typhus which succeeds the increased excitement is generally less in proportion to that excitement than in idiopathic fevers, a circumstance which assists in distinguishing phrenitis from synocha.

The imperfect diagnosis between these complaints is farther assisted by the effects of the remedies employed. For if in phrenitis we succeed in removing the delirium and other local symptoms, the febrile symptoms in general soon abate. Whereas in synocha, although the delirium and head-ach be removed, yet the pulse continues frequent, and other marks of indisposition remain for a much longer time. "Delirium vero febrile vel symptomaticum," says Lieutaud,† "præviæ febri

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* See the Observations of Saalman.

† Lieutaud's Synopsis Med. Pract.

"appenditur, solosque febricitantes adori-
"tur, cur minime mirum si, hoc sedato,
"perstet febris, solitamque periodum absol-
"vat. Aliter se res habet sub phrenitide;
"si enim resipiscant ægri, illico sanati res-
"tituuntur, si excipias virium debilitatem
"qua aliquandiu tenentur hoc gravissimo
"morbo convalescentes."

It will be of use to present at one view the circumstances which form the diagnosis between phrenitis and synocha.

Synocha generally makes its attack in the same manner;* its symptoms are few and little varied. The symptoms at the commencement of phrenitis are often more complicated, and differ considerably in different cases.

Derangement of the internal functions is comparatively rare in synocha. In phrenitis it almost constantly attends, and often appears very early. The same observation applies to the derangement of the organs of sense.

In synocha, the pulse from the commencement is frequent, strong, and rapid.

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* See the first volume.

In phrenitis, symptoms denoting the local affection often become considerable before the pulse is much disturbed.

In phrenitis we have seen that the pulse sometimes very suddenly loses its strength, the worst species of hemorrhagies and other symptoms denoting extreme debility shewing themselves; such symptoms are generally the forerunners of death. But that when the termination is favourable, the degree of typhus which succeeds is less in proportion to the preceding excitement than in synocha.

Lastly, if we succeed in removing the delirium and other symptoms affecting the head, the state of the fever is found to partake of this favourable change more immediately and completely than in synocha, where, although we succeed in relieving the head-ach or delirium, the fever often suffers little abatement.*

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* With every attention to the diagnosis of phrenitis, however, we may be deceived. Drs. Willis, Langrish, and Huxham relate cases in which traces of inflammation of the brain were discovered after death where the symptoms of phrenitis had not appeared; and Bonnetus

With regard to the duration of phrenitis, Eller[*] observes, that when it proves fatal the patient generally dies within six or seven days. In many fatal cases, however, it is protracted for a longer time, especially where the remissions have been considerable. Upon the whole, however, the longer it is protracted, provided the symptoms do not become worse, the better is the prognosis.

Such are the symptoms of the only form of phrenitis which, as far as I am capable of judging, deserves the name, the only true inflammation of the brain, for the comatose phrenitis in reality differs in no essential from apoplexy. And although dissectors have not been accurate in distinguishing the appearances connected with the different trains of symptoms, there is every reason to believe that the appearances after death in comatose phrenitis are the same as in apoplexy, viz. merely congestion in the

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Bonnetus and Morgagni relate some in which all the symptoms of phrenitis were present, and yet no traces of inflammation of the brain discoverable after death.

[*] Eller de Cog. et Cur. Morb.

larger

els; or this conjoined with congestion in the capillaries, that is, with traces of inflammation, in cases where the coma was preceded by delirium.

true indeed, that the furious and comatose phrenitis by various degrees run into each other; for as phrenitis on the one hand imperceptibly runs into synocha, it as imperceptibly on the other runs into apo-

From what has been said of congestion and inflammation, it is evident why coma supervening on delirium in phrenitis generally proves fatal: if while the capillaries are debilitated, the larger vessels supplying the vis a tergo which supports the circulation in them should greatly partake of the debility, the vis a tergo impelling the blood into the inflamed vessels must cease, and there will then be little hopes of restoring their action. When, on the other hand, the congestion in the larger vessels, and

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* I shall have occasion to treat of apoplexy when considering the nervous affections most frequently [illegible]cated with febrile diseases.

consequently the coma has been present from the beginning, the capillaries have never been much distended, the vis a tergo propelling the blood into them having from the first attack of the disease been enfeebled, they therefore support the circulation, and the hope of recovery is much better.

SECT. II.

Of the Appearances on Dissection.

IT appears from dissection that inflammation of the brain is subject to the same terminations with other inflammations.* When it proves fatal, some part of the substance of the brain has generally undergone suppuration. The membranes are more subject to gangrene.

Phrenitis sometimes proves fatal without having run to either of these terminations. The part affected then exhibits the same appearance as in external inflammations.

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* See the Sepulchretum Anatomicum of Bonnetus, and the Epistles of Morgagni.

The vessels conveying red blood are numerous and distended.

In those who have laboured under phrenitis, recovered and died afterwards of other complaints, the membranes of the brain have been found thickened, and in some instances converted into a substance almost as hard as bone,* and the dura mater is frequently found adhering to the scull in the places which had been occupied by the inflammation. Adhesions we shall find a very common effect of inflammation.

The pia mater however is not apt to adhere to the brain, but is, by inflammation, converted into a membrane resembling the dura mater in thickness and consistence.

In those who die of phrenitis, there is often a quantity of serum effused into the ventricles. If a tendency to gangrene has taken place, the fluid effused is a thin acrid serum. When we compare these appearances with those observed in patients who have died of hydrocephalus internus, we cannot help, I think, regarding this disease as a species of phrenitis. But this question will be examined at length when we come to consider the different species of apoplexy.

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* Van Swieten's Comment. in Aph. Boerhaavii. Aph. 775.

SECT. III.

Of the Causes of Phrenitis.

IN temperate climates phrenitis is a rare complaint, and when it does appear it is generally as symptomatic of fever. In the works of Sir John Pringle, and a few other European practitioners, the reader will find an account of dissections in which abscesses of the brain were found in those who died of fever. This however is comparatively a rare occurrence.

It is in warm latitudes that idiopathic phrenitis most frequently appears. Young people, especially those of a sanguine and plethoric habit, are liable to it, and all who indulge freely in the use of fermented liquors.

The exciting cause can frequently be traced to an injury immediately applied to the brain, such as violent exercise, intoxication,

cation, rage, or any other cause tending to occasion an accumulation of blood in the head, the head being long exposed to a warm sun, long and intense study.

It often arises however from causes less immediately affecting the brain. It has been the consequence of much fatigue of body as well as of mind. Excessive venery, indigestible and poisonous substances received into the stomach, and the suppression of habitual evacuations are also to be ranked among its exciting causes.

It is evident that many or all of these may sometimes act merely as predisposing causes.

Saalman* saw phrenitis epidemic, and asserts that is was contagious. It was chiefly confined to the lowest ranks of the people, who were covered with filth; and the contagion, he observes, was rendered so virulent by a neglect of cleanliness that in a single hovel five or more were seized with it.

This epidemic attacked the old rather

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* Acta Erud. Lip. vol. xxxii.

than the young, it was most fatal to those above 40. The hypochondriacal and melancholic were more subject to it than others. Such are the causes of phrenitis; it often however arises in the predisposed when it cannot be traced to any particular cause, especially in those who have formerly laboured under it, for, like the other phlegmasiæ, it leaves behind it a predisposition to future attacks.*

SECT. IV.

Of the Treatment of Phrenitis.

FROM what has been said of the treatment of the phlegmasiæ, and of the nature of phrenitis, the reader will infer, that the most vigorous antiphlogistic measures are necessary in this complaint, and there are few which require their more speedy employment.

Every part of the antiphlogistic regimen is necessary, but blood-letting is what we chiefly depend upon.

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* Van Swieten's Comment. in Aph. Boerhaavii.

It fortunately happens in this complaint, that a sufficient quantity of blood can generally be procured from the neighbourhood of the part affected, so that the same operation serves the purpose of both local and general blood-letting. When this advantage can be obtained, it is never to be overlooked. Many therefore advise blood to be taken from the temporal artery in phrenitis, Dr. Cullen thinks blood-letting from the jugular vein preferable; which is also particularly recommended by Hoffman and Eller. The frantic state of the patient however often renders it very troublesome to let blood from this vessel.*

Dr.

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* Several other modes of blood-letting have been proposed in this complaint. We have been advised to open the sublingual veins; this however is attended with several inconveniences. It is difficult to open them when the patient is delirious, a small orifice is not sufficient, and a large orifice is dangerous on account of the difficulty of stopping the bleeding.

Some recommend opening the frontal vein, others scarifying the nostrils. In neither of these ways, however, can we in general procure a sufficient quantity of blood.

If

Dr. M'Bride recommends pushing the blood-letting to syncope, and if this is warrantable in any case, it is in phrenitis. But it is at all times a precarious practice, and most practitioners choose rather to repeat the blood-letting than push it so far.

With regard to the extent and repetition of the blood-letting, our practice is regulated in the same way as in synocha, except that the evacuation should be more copious in proportion to the violence of the symptoms.

It may be inferred from what has been said of catharsis in inflammatory affections of

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If phrenitis be threatened, Hoffman observes, in consequence of the suppression of the menses or lochia, venesection is to be performed from the foot, if by a suppression of the hæmorrhois, leeches should be applied to the hemorroidal vessels; concerning the efficacy of these practices, at least after the symptoms of phrenitis have actually appeared, there is much doubt. Local blood-bletting appears always to be most successful when the blood is taken from the part affected, or as near it as possible. In the above cases, however, the application of leeches to the abdomen and hemorrhoidal vessels may assist more powerful remedies, and is a probable means of preventing a relapse.

of the head, that when spontaneous diarrhœa supervenes, we should be careful not to check it, and when it does not, the free use of cathartics is proper in all cases. Saalman gave calomel with other cathartics. Gentle cathartics, blood-letting, and acidulous drinks, he found the most successful remedies.

To assist in diminishing the determination of the blood to the head, the patient should be kept as near the erect posture as can easily be born.

A very few observations on the local remedies employed in phrenitis will be sufficient. Of these, local blood-letting is still the most powerful, and in all cases, where the blood in the general blood-letting is not taken from the head or neck, should be employed at an early period.

The head should be shaved, and, after the excitement has been sufficiently reduced, a blister applied over it.

A variety of rubefacients have been applied to the head in phrenitis, among which may be reckoned external warmth, which is however a very doubtful remedy. The application of cold to the head is more effectual; cloths dipped in cold water and vinegar, or even iced water, are often applied with advantage. Is the alternate use of cold and warm applications preferable? An eruption over the head has sometimes followed these applications, and very suddenly brought relief.

Warm bathing of the inferior extremities, and the application of rubefacients to them, for the purpose of revulsion, have been very generally employed. Dr. Cullen, however, regards them as very ambiguous remedies. If they be employed before the excitement has been sufficiently reduced, they may do much harm. It has been proposed to immerse the trunk and limbs in the warm bath while we make the cold application to the head.

As in all other complaints, when phrenitis can be traced to the suppression of some discharge, attempts to restore the discharge must make a principal part of the treatment.

CHAP. VII.

Of Ophthalmia.

OPHTHALMIA is defined by Dr. Cullen, "Rubor et dolor oculi, lucis intolerantia, "plerumque cum lacrimatione." Except omitting plerumque, for a reason which will presently appear, the only alteration I would propose on this definition is similar to that proposed on the definition of phrenitis. Phlegmasia cum rubore et dolore, &c.

Here however the change proposed is of more importance, and confines the definition to one species of ophthalmia, the ophthalmitis.* The reader will observe, that fever makes no part of Dr. Cullen's definition of ophthalmia, and the truth is, that although Dr. Cullen arranges ophthalmia among febrile diseases, there is but one species of it, and that the least common, which is attended with fever." It is evident, however, that this is the only species which deserves the name of phlegmasia. The others belong to the order of simple inflammations. These, however, not having been considered, and being intimately connected with the phlegmasia, it will be proper to treat of the whole here.

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* See the symptoms of ophthalmitis detailed, towards the end of the first section of this chapter.

Dr. Cullen divides ophthalmia into idiopathic and symptomatic. It is the former only we are to consider. The latter proceeds either from diseases of the eye, or parts in its neighbourhood, and comes under the care of the surgeon; or from diseases of the system, scrophula, lues venerea, or fever. The last I have frequently had occasion to mention; like it, the other species of symptomatic ophthalmia can only be considered with the complaints of which they form a part.

Dr. Cullen divides the idiopathic ophthalmia into two varieties, the ophthalmia membranarum and ophthalmia tarsi. The former he defines,

"Ophthalmia in tunica adnata et ei sub-
"jacentibus membranis sive tunicis oculi."

The latter,

"Ophthalmia cum tumore, erosione, et "exudatione glutinosa tarsi palpebrarum."

Other writers have divided ophthalmia into a great number of varieties; for most of their distinctions, however, there appears to be no sufficient foundation; but Dr. Cullen, as far as I am capable of judging, has attempted to simplify too much.

Had he made fever part of his definition of ophthalmia, he would have excluded by far the majority of cases. He therefore in his Nosology wholly overlooks that species of ophthalmia which almost uniformly occasions fever, and in his First Lines he regards it as only a greater degree of the ophthalmia membranarum; and it is true, that the inflammation of the adnata often spreads to the deep-seated parts of the eye, and produces the form of the disease alluded to, but it also spreads to the tarsi, producing Dr. Cullen's second species of ophthalmia, and the inflammation of the deep-seated parts often exists with little or no inflammation of the adnata, and produces a disease certainly as different from the ophthalmia membranarum and tarsi as these are from each other.

This species of ophthalmia has been termed ophthalmitis, and is the only species which belongs to the phlegmasiæ. To it therefore I have adapted the definition by introducing the term phlegmasia and omitting plerumque, the ophthalmitis being always attended with an increased flow of tears.

Ophthalmia then is divided into three species, according as it affects the eye-lids, the membranes which cover the anterior part of the eye, viz. the adnata, or as it has been termed from its colour albuginea, and conjunctiva, or the deep-seated parts of the eye, its muscles, and the lachrymal gland.

It is very rarely however, that any of these exist in a considerable degree without producing some degree of the other. The inflammation readily spreads along the conjunctiva, from the tarsi to the eye, or in the contrary direction. When the conjunctiva of the eye is much inflamed, the adnata soon partakes of the inflammation, and if the complaint increases, it gradually spreads to the deep-seated parts.

It will be the most distinct plan to consider the symptoms of each of these species separately, beginning with the most common, the ophthalmia membranarum.

SECT. I.

Of the Symptoms of Ophthalmia.

THE tunica conjunctiva, the chief seat of the ophthalmia membranarum, lines the inner side of the eye-lids, and is reflected over the anterior part of the eye. It was formerly doubted whether it covered the cornea, by later anatomists it has been dissected from this as well as from the tunica albuginea; to the former however it adheres much more firmly. In the eye of some quadrupeds, particularly that of the ox, the conjunctiva is separated from the cornea more readily than in the human body.

The part of the conjunctiva covering the cornea is least subject to inflammation. Neither in this part nor that covering the albuginea while in a perfectly healthy state, are there any red vessels. That part of the conjunctiva which lines the eye-lids, however, is at all times supplied with red blood.

Ophthalmia sometimes comes on almost instantaneously. It is then what is termed by the vulgar a blast in the eyes. In general however its attack is more gradual.

The first symptom of the ophthalmia membranarum is an unusual redness of the conjunctiva covering the albuginea. The redness is sometimes diffused over the whole albuginea, and sometimes appears in pretty well defined blotches on different parts of it. I have observed it come on in this way in both eyes at the same time, where the injury was not applyed to any part in particular.

In general the red vessels appear ramified on the albuginea, but in more severe cases it is so completely covered by a thick network of vessels, that it appears as if painted uniformly of a red colour, and then some red vessels can generally be traced on the cornea.

At the same time the inflammation spreads along the conjunctiva lining the eye-lids, often extending to the tarsi.

The patient complains of a sense of heat, and of a pricking or stinging pain which, when the inflammation runs high, is often very considerable, frequently resembling the sensation produced by a sharp particle of dust blown into the eye.

In mild cases the sensation accompanying ophthalmia is rather an itching than pain, and the itching is sometimes felt not in the eye itself but in the forehead.

Although the inflammation has not spread to the lachrymal gland, ophthalmia is very frequently accompanied with an increased flow of tears. It has hence been divided into wet and dry.

The secretion is sometimes vitiated, becoming glutinous, adhering to the tarsi, and often during sleep glueing them together. This symptom however is more troublesome in the opthalmia tarsi.

In the mildest form of opthalmia, termed by authors taraxis, there is little or no increased flow of tears. The more severe form of the ophthalmia membranarum has been termed chemosis. "In chemosi," Trnka[*] observes, "non modo autem ad- "nata rubet, sed sæpenumero etiam, J. L. "Schmuckero teste, uvea et choroidea."

In the taraxis the swelling is generally inconsiderable and wholly confined to the eye-lids, for even in mild cases of ophthalmia, the inflammation generally spreads to the conjunctiva lining the eye-lids. In the chemosis the swelling of the eye-lids is often so great, that the tarsi are turned inwards upon the ball of the eye, and the irritation of the eye-lashes rubbing against the conjunctiva, increases the inflammation. The swelling of the eye-lids sometimes produces an opposite effect, they are almost inverted, the tarsi being turned outwards and the eye remaining open.[†]

But in the more severe cases of the ophthalmia membranarum the swelling is not confined to the eye-lids; the coats of the eye partake of it. "Conjunctivam," Schmuckerus observes, "ab accumulato

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[*] Trnka's Historia Ophthalmiæ. The reader will find a good account of chemosis in the 127th and following pages of Vogel's Prælectiones Academicæ.

[†] Vogel Præl. Acad. de Cog. et Cur. Morb.

"sanguine usque adeo tumuisse observatum "est, ut tres quatuor pluresve lineas crassa "fuerit."* So great a degree of swelling in the conjunctiva is uncommon, but the coats which lie under it partaking of the swelling, it often appears upon the whole very considerable.

As the swelling, like the other symptoms of inflammation, is generally less considerable in the cornea than the other parts of the eye, it often appears sunk in a hollow formed by the tumified coats. "Son épaisseur," St. Yves † observes, "égale celle "d'un travers de doigt, ce qui fait paroitre "la cornée transparente comme dans un "enfoncement."

The swelling of the eye and eye-lids often becomes so considerable that the patient is unable to open the eyes. In this state the complaint has been called phymosis, the name of a similar affection of the penis. The degree of swelling in the worst cases of the ophthalmia membranarum is sometimes astonishing; we find one author relating a case in which the tumor equalled a man's hand, and another declaring that he has seen the eye so far protruded from the socket, that it rested on the upper lip.

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* Trnka, Historia Ophthalmiæ.

† Traité des Maladies des Yeux, by St. Yves. See also Vogel's Præl. Acad.

In such cases the inflammation not only spreads to every part of the eye and eyelids, but to the whole side of the face; the patient complaints of violent pains in the forehead and temples, and the cheek becomes swelled and inflamed.

Although the complaint had at first been confined to one eye, when it arises to this degree, the other always partakes of it.

The intolerance of light is generally proportioned to the degree of inflammation. In the less violent cases of ophthalmia membranarum it seems to proceed from the sympathy which subsists between the retina and every part of the eye. When the inflammation runs very high, however, every part of the eye more or less partakes of it.

Spasms of neighbouring parts, particularly of the eye-lids, often attend ophthalmia.

mia. In the more severe cases the whole muscles of the face become affected with them.

It was observed above, that external inflammations are less apt than internal to produce fever, and that inflammations of the head are apt to produce fever in proportion to their vicinity to the brain. In all cases in which fever is symptomatic of ophthalmia, we have reason to believe that the inflammation has spread to the deeper seated parts. The simple ophthalmia membranarum and tarsi never seem to occasion fever.

Such are the symptoms which attend the commencement and progress of ophthalmia membranarum; its consequences are very various.

Like other inflammations it is subject to resolution, suppuration, and gangrene.

If the inflammation be confined to the eye, resolution is the only termination which can be regarded as favourable; for according to the definition of suppuration I have adopted, a discharge of pus without ulceration, which frequently takes place from the eye and has given rise to the name purulent ophthalmia, does not deserve the name of suppuration. When the eye-lid partakes much of the inflammation, suppuration is often a favourable termination. If, however, the abscess is discharged on the inner side of the eye-lids, it frequently proves troublesome.

The effects of suppuration of the eye itself are various. " During the continuance " of the inflammation," Mr. Ware* observes, " small ulcers are often formed on " the cornea: which being first caused by " it, serve afterwards to increase it, and " render the cure more difficult. These " ulcers generally heal in a depression, " which is a great impediment to the sight, " causing objects to appear as if they were " seen through crinkled glass.

" Small abscesses are also sometimes " formed between the lamina of the cornea, " which, instead of discharging their con" tents, harden into white opaque specks, " and according to their size either partially " or totally prevent the entrance of the light.

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* Mr. Ware's Treatise on Ophthalmia, &c

"When the thickening of the cornea," Mr. Noble[*] observes, "is towards the centre, and so great as to prevent the passage of the rays of light to the retina, "the eye will frequently accommodate itself to its imperfections by turning on "one side, that the transparent part of the "cornea may be opposed to the object." The reader will find a striking instance of this related by Mr. Noble.

"If the specks are superficial," Mr. Ware proceeds, "they may wear off in a course "of time, but if they penetrate through "the whole thickness of the cornea, they "do not seem to admit of any remedy.

"These abscesses sometimes burst on the "inside of the cornea, and discharge the "matter they contain into the anterior "chamber of the aqueous humour, to the "bottom of which it descends by its own "weight, and there it makes an appearance like the white speck at the root of "the nails, on which account it has been "called onyx. The matter thus produced

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[*] A Treatise on Ophthalmia by Mr. Noble.

"is usually small in quantity; the solid "texture of the cornea naturally indisposing "it for a large suppuration.

"Nevertheless it not unfrequently hap-"pens, when there is a long continuance of "a violent ophthalmy, that the quantity of "matter formed in the anterior chamber, "becomes much more considerable without "any perceptible disorder in the above "mentioned coat of the eye, and in this "larger collected state it takes the name of "hypopion. It is difficult to ascertain as "well the source from which this matter "proceeds, as the manner in which it is "formed." This seems to be only one of the many instances in which pus is formed by inflamed surfaces independently of ulceration. The pus is sometimes absorbed, a colourless aqueous fluid being secreted, by which the sight is restored. "Matter "sometimes collects also in the posterior "chamber of the aqueous humour. It "may here either remain in a fluid state, "or be inspissated into a solid substance. "If it continues fluid, a part of it usually "passes through the pupil into the anterior

" chamber, and falls to the lower margin " of the cornea.

" When it becomes inspissated, it most " commonly forms adhesions, either to the " capsule of the crystalline humour or to the " posterior surface of the iris, or to both; " and in consequence of these adhesions, the " pupil becomes contracted, and its figure is " rendered more or less irregular according " to the extent of the adhesion. Sometimes the inspissated matter continues " loose, and varies its position in the aqueous humour. In this case, if it is small " in quantity, it changes its place, according " to the direction in which the head is held, " and therefore sometimes passes through " the pupil into the anterior chamber. " Sometimes again the inspissated matter " remains fixed in the posterior chamber, " and there takes the shape of a membrane, " dividing this chamber into two distinct " cavities, and answering precisely to the " idea entertained by the ancients of the " cataract. This membrane often adheres " by its circular edge only; the middle " part continuing loose and moveable. In

" such a case, as the adhesion is only partial, the pupil still keeps its figure, and " the iris also preserves its capacity for motion, though not to the same extent as " when there is no adhesion. When the " pupil contracts, the adventitious membrane has in some instances been observed to protrude through it, but to return to its former and common situation " when the pupil is dilated.

" If the increased action and sensation," Mr. Noble observes, " are not very violent, " the vessels in many parts of the cornea " secrete a small quantity of pus, which is " deposited at their extremities, and is not " sufficient to produce a speck, but gives " the eye a dull whitish muddy appearance, " which has been called nebula or a cloud. " The pupil is scarcely visible through it, " and objects are not distinguished by the " patient. The organisation of the cornea " is not much injured by it, as on the inflammations subsiding the opacity is soon " absorbed, and the sight returns."

It is very doubtful whether this appearance is owing to a secretion of pus. Other parts of the eye, we have reason to believe, besides the crystalline lens, are subject to opacity independently of suppuration. The appearance of the cloud which frequently succeeds even slight cases of ophthalmia, is much against the supposition of its arising from any secretion of pus, which, except when secreted on a surface, is always collected in a cavity formed for its reception; and with respect to the opacity of the aqueous humour, although all writers admid that its opacity, which sometimes remains after severe ophthalmia, is frequently owing to a secretion of pus, yet it has with much probability been maintained, that inflammation sometimes occasions an opacity of this humour independently of any admixture of pus. Nay, the true cataract, the opacity of the crystalline lens, has sometimes though rarely been the consequence of ophthalmia. "Produci solet cataracta," says Lieutaud,[*] "a defluxionibus chronicis gravioribus, *ophthalmiis*, epiphora contumaciori, cephalalgia perenni, contusionibus," &c.

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[*] Synopsis Medicinæ Praxeos.

"If the abscess," Mr. Noble observes, "should be very large and deep seated in "the substance of the cornea, and burst internally, such a considerable support is "frequently taken away from that part of "the cornea, that the remaining portion is "no longer able to support the action of "the muscles, but gives way, and as when "all the muscles act at the same time they "press the sides of the eye nearer together "and inwards, a part of the iris is protruded through the wound in the cornea, "forming a small black spot, which has "been compared to the head of a common "fly, and is spoken of by authors under the "name of myocephalus.

"If the protrusion is small, though the "form of the pupil is changed to an oblong, "yet still the iris retains its motion, and "the sight is little injured: but if large it "loses its power of contraction and dilatation, and in some cases the edges, from "being inflamed and remaining sometime "in contact, adhere and the pupil is obliterated."

Another consequence sometimes follows

suppuration of the cornea; when it is rendered so thin as to be no longer capable of confining the humours, part of these are sometimes protruded in the form of a hernia, and become incrassated.* This affection was termed by the ancients staphyloma.

Such are the principal consequences to be dreaded from suppuration in the ophthalmia membranarum.

Mortification is a rare occurrence in any form of ophthalmia, and never perhaps supervenes in the ophthalmia membranarum.

But besides the terminations common to all kind of inflammation, this form of ophthalmia is sometimes followed by consequences wholly resulting from the nature of the parts it occupies. I have already had occasion to mention the opacity of the cornea, aqueous humour, and chrystalline lens, independently of any formation of pus, as consequences of ophthalmia.

One of its most remarkable consequences is such a contraction of the iris, that there hardly remains a vestige of the pupil. The sight has sometimes been restored in this case by making an artificial pupil. "Verum "cum puris pars," Trnka* observes, "in "anticis oculi cameris adhæsisset, irritata "inde iris adeo sese contraxit ut ne vesti"gium quidem reliquerit pupillæ. Cum "autem oculus nativam suam globositatem "conservasset, ægerque illius ope et lucem "a tenebris et umbras corporum ante illum "motorum distingueret, pupilla artificialis "in eodem facta est. Sicque æger bimestri "post operationem hoc oculo omnia objecta "rite distinguebat."† A fissure of the iris also, termed staphyloma iridis, has been the consequence of violent ophthalmia membranarum.

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* See the 5th case of ophthalmia related by Hoffman.

It is not uncommon for new vessels and other parts to be formed, which impede or entirely obstruct the functions of the organ. "Hence, at times," Mr. Noble observes, "we find an increase of cellular substance

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* Historia Ophthalmiæ.

† The reader will find a remarkable case of this kind from Citiz. Demours's Observations on the artificial Pupil, in the 25th number of the London Medical Review and Magazine.

" to the conjunctiva with a congeries of " new vessels, which generally produce a " prominent ridge running from one of the " angles towards the centre of the cornea. " At other times, when the inflammation " has been violent and of some continuance, " small vessels are to be seen on the external surface of the cornea. In general " there are not many, and their course is " from the edge of the cornea towards its " centre in right lines. Though commonly " there are not more than from six to eight " or ten of these vessels, in some the whole " cornea is surrounded with them, which " have the appearance of radii converging " to a centre; and in some few cases, when " the inflammation has been rather severe, " has several times a little subsided, and has " again returned in quick succession, this diseased action has gone so far as to permeate " the whole body of the cornea, giving it the " appearance of a highlyvascular substance." **** "This peculiar action of the vessels is " not confined to the external surface of the " eye alone. At times it affects the iris, and " small spots or filaments are projected from

“ its circular edge, which have somewhat
“ the appearance of the iris in a horse. If
“ they continue to be secreted, they extend
“ themselves either till they unite with the
“ projecting membrane on the other side,
“ and thus form an opaque substance, which
“ occupies the circular aperture of the iris,
“ and prevents vision; or else they unite to
“ the capsule of the chrystalline lens, by
“ which the motion of the iris is impeded,
“ and the sight rendered very imperfect. It
“ must be observed, however, that in this
“ latter case the vessels of the capsule of
“ the chrystalline humour are previously
“ affected with this kind of diseased action,
“ which generally begins towards the cen-
“ tre; and if, after the projecting fibres
“ from the iris have continued for some
“ time, the eye is carefully examined, it will
“ generally be found, there is a small
“ opaque spot on the centre of the capsule.
“ In a few weeks, and sometimes even in
“ a few days, it will be seen that the iris
“ has almost lost all motion, and that near
“ its edge on the capsule, there is a small
“ circular clear ring, through which what

"little sight the patient has must be obtained, as the middle is occupied by the "white opaque spot." * * * * "Occasionally the action of the vessels in the internal part of the eye is so far diseased, as "to change the structure of the vitreous "humour or to induce a paralysis of the "retina."

The latter consequences are only to be dreaded when the ophthalmia membranarum is complicated with the ophthalmitis, the symptoms of which we are presently to consider.

Besides the foregoing consequences, ophthalmia may produce diseases of the puncta lacrymalia, of the lacrymal sack, and passage from this to the nose. But it would be improper here to enter more particularly into the various consequences of ophthalmia, all of which come under the province of the surgeon.

Such are the symptoms and principal consequences of the ophthalmia membranarum, the most common form of the disease; on those of the ophthalmia tarsi a very few observations will be sufficient.

In its attack this form of the disease often resembles the foregoing, the inflammation first appearing in the conjunctiva, or to speak more accurately, the ophthalmia tarsi often follows a slight attack of the ophthalmia membranarum. The inflammation however soon spreads to the tarsi, where it frequently indeed makes its first appearance, but it seldom becomes considerable there, without affecting the conjunctiva of the eye.

The tarsi are red and swelled, and pour out a glutinous matter which glues the eyelids together during sleep, and both in this way, and by forming small hard masses adhering to the eye-lashes, increases the complaint.

The patient complains of a constant uneasiness of the eyes, but never of the severe pain which sometimes attends the ophthalmia membranarum. The uneasiness is increased by the falling off of the eye-lashes which defend the eye from strong light, dust, &c.

Both the ophthalmia membranarum and tarsi are apt to become chronic complaints, but the latter much more frequently than the former. It is not uncommon, particularly in scrophulous habits, for the ophthalmia tarsi to last for the greater part of life; but it is less apt to be followed by injury of the sight than the ophthalmia membranarum. It is seldom however that there is any considerable degree of the one without more or less of the other, and in different cases they are combined in every possible degree. The ophthalmia tarsi more frequently runs to suppuration than the other varieties of the complaint, small suppurations often forming at the same time in various parts of the tarsi, and frequently without considerably relieving the inflammation. Except when combined with ophthalmia membranarum, it never runs to gangrene, nor does it ever terminate in schirrus.

It often happens when the ophthalmia tarsi is attended with much swelling, as where it is accompanied with a considerable degree of the ophthalmia membranarum, that the eye-lids grow together. This is the consequence of small suppurations forming on the tarsi, or of the cuticle being abraded by the acrimony of the discharge. Any parts of the body deprived of the cuticle and kept closely applied will adhere. The surgeon readily removes blindness from this cause by separating the tarsi by the knife, and preventing them from again growing together by the interposition of proper dressings till the wounds are healed.

The symptoms of the most alarming form of ophthalmia still remain to be considered, in which the inflammation attacks the deep-seated parts of the eye, and gives rise to one of the most tormenting complaints we are subject to. This form of the disease is termed by some ophthalmitis, by others phlegmon oculi, some term it chemosis, the appellation generally used for the severer cases of the ophthalmia membranarum.

The ophthalmitis sometimes comes on without being preceded by either of the other species of ophthalmia, and it now and then happens that the anterior parts of the eye remain free from inflammation. In many cases however the anterior parts are first affected, and the inflammation spreads gradually to the deep-seated. As soon as the inflammation spreads to the latter, the pain becomes more severe, extending to the temple and over a great part of the head, often particularly felt, St. Yves remarks, on the crown of the head, and increased by the slightest pressure of the eye.

As the deep-seated parts become affected, the inflammation of the conjunctiva and adnata sometimes abates.

When the inflammation seizes the lacrymal gland, there is a severe pain referred to its seat, the flow of tears is very great, and some protuberance of the upper eye-lid may often be observed.*

As soon as the retina becomes affected, the sight grows confused, the patient sees every thing covered with black spots, incessant clouds pass before the eyes, or fire seems to dart across them. Deceptions of vision sometimes attend the ophthalmia membranarum when the inflammation has spread to the cornea.† As the inflammation of the retina increases, the intolerance of light becomes extreme, and the patient is at length seized with a degree of phrenzy, if the eyes be exposed to it.

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* Lieutaud's Synopsis Prax. Medicinæ.

† See Dr. Home's Obs. on Chemosis. Princip. Medic.

This form of the disease never lasts long without being attended with fever; and when the pain of the eye is very great, it is not uncommon for delirium to supervene.

With one or both eyes thus affected, the patient passes sleepless nights, always in severe pain; in many cases, with intervals of excruciating torture.

If the thickened conjunctiva, says Lieutaud, protrude beyond the cornea, (the different species of ophthalmia, we have seen, are often combined) if the lacrymal gland be inflamed, if the pains at the bottom of the orbit be excessive, spreading over the head, if the fever be great, and the watching constant, total blindness is to be feared. We have sufficient proof in Trnka's Historia Ophthalmiæ, of amaurosis sometimes being the consequence of severe ophthalmia; this however is not a common effect of the disease.

It is unnecessary to observe, that resolution is the only favourable termination of ophthalmitis. Suppuration is often attended with a general efflux of all the humours; and gangrene, while it proves as destructive to the eye, endangers life.

We judge of the tendency to these different terminations in the same way as in the other phlegmasiæ. When the symptoms are moderate, and yield to the usual remedies, we have reason to hope for resolution; when they are unusually obstinate, suppuration is to be dreaded; when unusually violent and yielding in little or no degree to the proper remedies, gangrene.

With respect to schirrus, regarded by many as a consequence of ophthalmia; when it follows this complaint, it seems to proceed less from the violence of the inflammation than some peculiarity of disposition. The observations on schirrus and cancer, quoted from Dr. Cullen when speaking of inflammation in general, are applicable here.

When ophthalmia is attended with fever, like other febrile diseases, it is occasionally terminated by critical evacuations, by spontaneous hemorrhagy, sweat, or diarrhœa.

SECT. II.

Of the Causes of Ophthalmia.

THE different species of ophthalmia may appear at any age and in any habit. Certain species however are most apt to attack certain constitutions, and to appear at certain periods of life. In the young, robust, and sanguine, the ophthalmia membranarum and ophthalmitis are most common. The ophthalmia tarsi is more apt to attack those of a delicate habit or of an advanced age.

The scrophulous ophthalmia at least, is often hereditary.

As happens with respect to all other inflammations, those who have already laboured under ophthalmia are most liable to it.

It is more frequent in spring and autumn, than in seasons when the weather is less variable. Among the predisposing causes may be ranked the complaints in which ophthalmia most frequently supervenes. It more frequently accompanies synocha than typhus, and some of the exanthemata more frequently than either; particularly, measles, small-pox, and scarlatina. It is a frequent concomitant of all inflammatory affections of the head.

Such appear to be the chief predisposing causes of this complaint. Some even of these act occasionally as exciting causes, and in the numerous list of exciting causes the reader will readily perceive that there are many which must act occasionally as predisposing.

Dr. Cullen arranges the exciting causes of ophthalmia under ten heads, and numerous as his catalogue is, he seems to have omitted many. The situation, use, and extreme delicacy of the eye, render it so subject to injury, that there is no disease perhaps which may be occasioned in a greater variety of ways, than inflammation of this organ.

Dr. Cullen's first division of the exciting causes of ophthalmia are, "External violence, by blows, contusions, and wounds "applied to the eyes, and even very slight "impulses applied, whilst the eye-lids are "open, to the ball of the eye itself."

These causes may excite inflammation of the eye in the same way in which mechanical injury excites inflammation in any part of the body; but they may also act only indirectly as exciting causes of ophthalmia, by occasioning some derangement in the structure of the eye, which often proves a more obstinate cause of inflammation. In consequence of a blow on the eye, the crystalline lens has burst its capsule, and been forced through the iris into the anterior chamber of the eye, where it has lain for some years, or even the greater part of life, occasionally exciting inflammation.*

A blow on the eye frequently occasions an extravasation of blood under the conjunctiva, which is absorbed very slowly; the quantity is sometimes so great as to distend the conjuctiva, giving it the appearance it assumes in chemosis; at other times, when the quantity is small, it forms only a red spot or blotch. Before the extravasated blood is absorbed, it becomes dark and livid. It never however excites much inflammation, nor leaves any permanent affection of the sight; where these happen, the cause which produced the extravasation has at the same time otherwise injured the eye.*

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* The reader will find two cases of this kind related by Mr. Noble, in his Treatise on Ophthalmy.

That wounds with sharp instruments may in various way so derange the structure of the eye as to leave it subject to ophthalmia, may be readily conceived.

"If, by the wound, the iris is divided, "or the cornea penetrated very near where "it is joined to the tunica sclerotica, part "of the iris is frequently protruded through "the aperture, and forms one species of "the staphiloma. In that case the figure "of the pupil is changed from a circular "to an oval, or some other irregular form; "but if the protrusion is small, the part of "the iris which is not displaced preserves "its power of contracting and dilating, "and the sight, after the subsiding of the "inflammation, is as perfect as before.

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* Mr. Ware's Treatise on Ophthalmia, &c.

"the other parts of the system, whereby "from a certain state of these parts, either "a simultaneous, or an alternating affection "of the eyes is produced."

In the eighth division Dr. Cullen alludes to the ophthalmia, which sometimes accompanies scrophula, lues venerea, and some other diseases. It would be tedious and foreign to my design to enter here into the dispute whether there really be such a complaint as the venereal ophthalmia,* or whether ophthalmia ever arises from the absorption of pus.

The causes included in Dr. Cullen's ninth division may produce either symptomatic or idiopathic ophthalmia. "A change in "the distribution of the blood, whereby "either a more than usual quantity of "blood, and with more than usual force, is "impelled into the vessels of the head, or "whereby the free return of the venous "blood from the vessels of the head is in-"terupted." Hence the ophthalmia symptomatic of synocha, of apoplexy, &c. and hence also ophthalmia from violent exercise or any other cause which occasions an unusual determination of blood to the head.

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* See the Treatises of St. Yves, Mr. Ware, and others.

There are some causes of idiopathic ophthalmia, however, not referrible to any of the foregoing heads.

Ophthalmia, like most other inflammations, often arises from cold, especially if alternated with a high temperature, and combined with moisture. The application of cold to the eye itself often produces ophthalmia in the predisposed. It more frequently has this effect however when applied to the body in general, and particularly to the extremities. Hence the frequency of ophthalmia in cold, moist, and variable weather.

Certain ingesta will sometimes produce it in the predisposed. Instances are related by Trnka and others in which a small quantity of certain fermented liquors produced ophthalmia, while the patient could take many times the quantity of alkohol in any other form without experiencing the same effect. Whatever indeed produces much irritation of the primæ viæ may, especially in the predisposed, excite ophthalmia.

The ophthalmia which sometimes accompanies considerable derangement of the stomach and bowels, for example from worms lodged in these cavities,* may be regarded rather as symptomatic than idiopathic.

Cases are mentioned by Dr. Whytt of Edinburgh and others, of people of a delicate habit, subject to nausea and other disorders of the stomach, who never had an attack of such complaints without at the same time suffering from ophthalmia, a remarkable instance of which I have frequently witnessed. The reader will find cases (one is related by Trnka) in which ophthalmia was induced by hypercatharsis. An opposite state of the bowels, costiveness, is a more frequent cause of the complaint. There is reason to believe that these causes act chiefly in consequence of the irritation they occasion. They may partly however be referrible to Dr. Cullen's ninth division. Are the following causes referrible to the same division? A check given to insensible, or what is still more apt to produce ophthalmia, to sensible perspiration: The retrocession of inflammation of the surface or of eruptions of various kinds: The ceasing of habitual hemorrhagies or other discharges, and the subsiding of tumors.

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* Trnka, Historia Ophthalmiæ.

Derangement of the excretions however, independently of any change in the distribution of the fluids, seems capable of producing ophthalmia. Trnka says, that he has observed a patient seized with ophthalmia, on the urine, from being very fetid, becoming natural.

Although on the ceasing of habitual discharges, the change produced in the distribution of the fluids may have a considerable share in occasioning this and similar complaints, it would appear, I think, from many observations, that much of the effect is to be ascribed to irritation occasioned by the retention of what ought to be expelled.

It is a common opinion that ophthalmia is contagious, at least that the disease may be taken by looking at those affected with it. This opinion, which is as old as Ovid, "Dum spectant læsos, oculi læduntur et "ipsi," may have originated in various ways. Particularly in moist variable weather, ophthalmia is sometimes so general as to be almost regarded as an epidemic.* Some species of it are more or less hereditary, so that it is not uncommon for many children of the same family to labour under it.

Improbable as the opinion appears, that a complaint of this nature should be contagious, it has even been maintained by physicians, and some instances have been adduced to establish the truth of it, in one of which three servants, it is said, received the disease from their mistress, and in many it was received by sleeping with those affected by it. The only fact with which I am acquainted tending to support the opinion is, that many experience an increased secretion of tears when they look at those labouring under ophthalmia. Whether or not this sympathy may go so far as to produce the disease in the predisposed, it is difficult to say.

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* "It often," Mr. Ware observes, "affects a whole "neighbourhood at the same time; as was the case "during the summer 1778, at Newbury in Berkshire, "and in several of the camps; where it was known "by the name of the ocular disease."

Another popular opinion is, that the tears of those labouring under ophthalmia, if applied to the eyes of others, will produce the disease. Although this opinion is even more generally received than the last, it seems to rest on no better foundation.

One circumstance which greatly varies the exciting causes of most complaints, should always be kept in view. If habit or any other cause has once produced a strong tendency to a disease, almost every thing which deranges the system, and still more whatever affects the seat of the complaint, acts occasionally as an exciting cause, although the same causes may be applied a thousand times to the unpredisposed, without producing a single symptom of the complaint. This observation is particularly applicable to some of the foregoing causes of ophthalmia.

SECT. III.

Of the Treatment of Ophthalmia.

THE indications in the treatment of ophthalmia when attended with fever, are the same as in the other phlegmasiæ.

1. To remove the remote causes if they still continue to operate.

2. To diminish the vis a tergo.

3. To excite the debilitated vessels of the part.

In many cases the application of the remote causes is only momentary, as in ophthalmia from blows and wounds; or they are such as we have no means of removing, as in ophthalmia from a portion of the iris having been protruded through a wound of the cornea.

When ophthalmia arises from hard particles introduced under the eye-lids or adhering to the eye, these must in the first place be removed. This the patient often instinctively does by rubbing the eyes, which both increases the flow of tears occasioned by the extraneous body, and by moving it from place to place promotes its expulsion. If this fails, by holding the eye-lids open and desiring the patient to look to the side opposite to the seat of the offending cause, it may often be perceived, and is then in general readily removed. Immersing the eye in an eye cup filled with water, and then opening it, is often successful; or if many particles have entered the eye, it may be gently syringed with warm water. When particles are insinuated under the upper eye-lid, it is sometimes necessary to invert the lid.*

When they adhere to the cornea or other parts of the eye with such force as resists gentler means, they must be removed with the point of the lancet, or, as Mr. Ware advises, with a blunt pointed scoop.

One of the most troublesome causes of ophthalmia is an inversion of the eye-lids, so that the eye-lashes press on the ball of the eye. The following observations of Mr. Ware seem to include all that need be said on this part of the subject. "For an oph-

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* Mr. Ware's Treatise on Ophthalmia.

"thalmia thus produced, a palliative cure "may be effected, or, to speak more con- "formably to the fact, a present and tem- "porary relief may be given to the patient, "by taking out the lashes with a forceps. "* * * But while the lids retain this in- "verted state, no sooner do the hairs grow "again, than the disorder will again return; "nor can the patient be ever properly said "to be cured of the complaint till the edges "of the lids are restored to their natural "position, and can be kept in it.

"It is however necessary that a distinc- "tion be made between an inversion of "the upper and lower lid. For an inver- "sion of either will produce the same "effect, yet in the different lids, it appears "to arise from different causes, and conse- "quently to require different methods of "cure.

"The upper lid and its ciliary edge, both "in motion and at rest, are preserved in "their natural situation, by the equal, "though contrary, actions of the musculus "orbicularis and levator palpebræ supe- "rioris; but the lower lid, whose motion is

" very small in comparison with that of the " former, has no muscle correspondent to " the levator of the upper, and is preserved " in its natural state by the equal action of " the orbicular fibres spread over it, and " the counteraction of the skin which co" vers it; in which last respect it differs " materially from the upper lid, the skin of " which on the contrary being always very " thin and flaccid, is incapable of any such " counteracting power.

" From the above account, it is manifest, " that when the trichiasis affects the upper " lid, it must be owing to a relaxation of " the levator palpebræ superioris, and a " contraction of the superior part of the " orbicularis; whereas in the case of a tri" chiasis affecting the lower lid, it can only " arise from a relaxation of the skin and a " contraction of the inferior part of the or" bicularis. And as in these two cases, the " causes of the disorder are very different, " so they will of consequence require a " very different treatment.

" In the trichiasis of the lower lid, it " will be necessary to increase the con-

" tracting power of the skin which covers
" that lid, so as to prevent the contraction
" of the musculus orbicularis. Whereas in
" the trichiasis of the upper lid, it is plain
" that the sole object of attention must be
" to give an additional stimulus to the leva-
" tor palpebræ superioris, for the purpose
" of exciting it to proper action. The tri-
" chiasis of the upper lip happens but sel-
" dom. But in an instance of this kind
" which did occur, an entire cure was pro-
" duced by an operation."

Cauterizing the levator palpebræ superioris, by which such a contraction was produced in it as often takes place in muscles after burns.*

" The trichiasis of the lower lid is a more
" common complaint. When it is recent,
" a cure has sometimes been accomplished,
" by making a fold in the skin below the
" inverted lid to draw its edge from the
" eye. In some cases nothing more will
" be requisite to preserve the fold, than to

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* The reader will find an account of this case and of the manner of performing the operation, in the 94th and following pages of Mr. Ware's Treatise.

" cover it with a piece of sticking plaster. " But at other times, when the plaster " cannot be made to fasten, it will be necessary to use an instrument for the purpose, which must be so contrived as to " take up a small portion of the skin, and " to hang by it on the cheek.

" When the disorder is slight, the skin " may be restored to its natural state by " the methods above described. But in " more obstinate cases I have generally " been obliged for the same end to cut off " a small transverse portion of the loose " skin below the edge of the lid, and afterwards confine the sides of the wounds " together by means of two or three sutures, which has effectually answered the " purpose.

" There are cases however in which none " of these methods will be sufficient for the " cure, as where the ciliary edges are not " only inverted, but likewise contracted in " length.

" Under these circumstances, relief is to " be obtained in no other way, but by enlarging the circumference of the ciliary

" edges. This may be done either by an " incision at the outer angle, or by a com- " plete division of the cartilage called " tarsus, in the middle. The first of these " operations is no more than a simple " straight incision, which may be made " with a sharp pointed curved bistoury. " The last, which is seldom necessary, will " also be best performed by the same in- " strument, only observing that the point " be carefully introduced between the globe " and eye-lid, and carried below the car- " tilage, that is, about one-eighth of an " inch in the whole; whence it is to be " pushed outward in a horizontal direction, " till it has cut its way through the lid; " the cartilage being thus entirely divided, " each portion will recede towards the an- " gles, and a separation be left between " them, which will not only take off the " complaint for the present, but prevent " the possibility of its return for the future.

" I have only farther to add on the " extraordinary instance of an ophthalmy " produced by a preternatural row of " eye-lashes growing out of the inner "termination of the edge of the lid; that, "as far as hitherto appears, nothing better "can be done for it than the application "of the palliative remedy above men"tioned; I mean the frequent extraction "of the hairs by the roots: for tho' other "attempts have sometimes been made, they "have proved so very unsuccessful as not "to deserve farther notice."

There is only, as far as I know, one case of ophthalmia from the eye-lashes omitted in the foregoing quotation. It sometimes happens, where there neither are hairs which deserve the name of preternatural, nor any inversion of the eye-lids, that a few delicate hairs, particularly towards the inner canthus, in those of a fair complexion often hardly visible, will turn in upon the eye, and support a very gentle and moderate ophthalmia, an obstinate case of which I have seen, where, from the extreme minuteness of the hairs, the cause was not for a long time suspected, in which however every remedy failed till it was removed.

If ophthalmia proceed from the presence

of irritating matter in the stomach and intestines, this must be removed by emetics and cathartics; if from hypercatharsis, by astringents and anodynes, which both tend to check the hypercatharsis, and allay the irritation which attends it. If from the suppression of the excretion by the skin or any other, we must endeavour to restore it.

We are also to restore the discharge if it arises from the drying up of sores or issues, or the suppression of hemorrhois; if from the retrocession of eruption, the means of recalling these pointed out in speaking of eruptive fevers must be employed.

Among the causes of ophthalmia most frequently applied after the commencement of the complaint, is the application of light and heat.

The evident advantage derived from excluding the light has given rise to various contrivances, which, by increasing the temperature of the part, often do more harm than good. The light should be excluded without preventing the access of cool air. In severe ophthalmia, the paticnt should always be confined to a dark well ventilated chamber. The total exclusion of light is not necessary where the inflammation is slight. But exercise of the eye must be avoided in all cases.

The morbid secretion from the inflamed eyes, by the irritation it occasions, is often a means of increasing the complaint. The eye ought therefore to be frequently washed. The proper composition of the lotion we shall presently have occasion to consider.

The irritation arising from the morbid secretion is farther increased by its gluing together the eye-lids during sleep. This is prevented by interposing between the eye-lids some mild ointment. By the same means the discharge may be prevented from forming into small hard masses on the tarsi.

As every thing which occasions a determination of blood to the head may produce ophthalmia, much exercise is to be avoided, and every other cause which increases the rapidity of the circulation, and the head should be raised when the patient is in bed.

Having as far as we are able, removed the causes of the ophthalmia, we must endeavour to excite the debilitated vessels of the eye, the first step towards which is diminishing the vis a tergo.

The means which diminish the general excitement are of comparatively little service where the complaint is merely local. Their employment therefore is chiefly confined to the ophthalmitis, that species of ophthalmia occasioning fever; and respecting their employment there is nothing to be said in addition to what was delivered when speaking of the treatment of the phlegmasiæ in general.

As in phrenitis, blood-letting from the jugular vein is more effectual than from the arm. In the worst cases of ophthalmitis we have seen the inflammation spread to the brain; the complaint is then to be treated in precisely the same way with phrenitis, with the addition of the local remedies about to be pointed out.

With respect to catharsis, I have already had occasion to mention the necessity of having immediate recourse to it when there is reason to suppose that the disease has in any degree arisen from the presence of irritating matter in the primæ viæ. But independently of this, it produces the same good effects in ophthalmia as in other inflammations of the head, and that whether the complaint be accompanied with fever or not.

With regard to the other evacuations affecting the whole system, diaphoresis is always beneficial, when it is general and excited without much increase of temperature and heating medicines; it is particularly indicated where the complaint has arisen from cold, or other causes suppressing the perspiration. Except ophthalmia arises from the morbid contents of the stomach, vomiting is pernicious, and the more so the more severe the ophthalmia.

While we are endeavouring to diminish the vis a tergo by evacuations, we must be careful not to increase it by improper diet. The food should be of the mildest kind, and in order to defend the stomach and bowels against the irritation of their contents, it should be mucilaginous. In the most severe cases of ophthalmitis it should consist chiefly of some mild farinaceous decoction,

coction, which, while it allays thirst and supplies sufficient nourishment, tends both to moderate excitement and promote the perspiration. Such are the means which diminish the vis a tergo by diminishing the general excitement. It is to be recollected however, in this as well as in all other inflammations, that, as the vis a tergo supplying the capillaries is supported by the vessels immediately preceding them in the course of the circulation, all local evacuations, while they relieve the congestion in the inflamed vessels, tend at the same time to diminish the force which distends them.

We may sometimes produce a local evacuation sufficient to relieve ophthalmia, by increasing some of the neighbouring secretions; the secretion of the tears, of the mucus of the nose, of the saliva, or that by the skin of the head.

Increasing the two first is a doubtful practice, and an increased flow of saliva seldom affords much relief.

Few substances, however mild, can be applied to the eye without occasioning an increased secretion of tears, and the various collyria, which we shall presently have occasion to consider as otherwise useful, may be of service in this way. But certain acrid substances which have been employed merely with a view to increase the secretion of tears, generally do more harm than good.

Authors are much divided in opinion respecting the employment of errhines in ophthalmia. Trnka, who gives cases in which they seemed to be of service, and some others warmly recommend them, while many pronounce them at all times inadmissible.

The sudden determination of blood to the head which they occasion would, a priori, induce us to side with the latter, yet there would seem to be cases in which they may be used with advantage; but as it is very difficult to distinguish those cases, errhines, if not wholly struck out from the catalogue of remedies employed in ophthalmia, must be used with caution, and ought to be among the last remedies we have recourse to.

Two cautions particularly insisted on by

Trnka are never to be overlooked in their employment, that they should be delayed till the excitement has been reduced, and that the more gentle errhines only should be employed. Trnka recommends a mixture of calomel and sugar. "Vidi solius "hujus pulveris usu," says a writer quoted by Trnka, "magnas contumacesque oph-"thalmias fuisse profligatas."

Sialogogues are safer remedies, but little to be depended on. Some assert that they have seen cases, even where the symptoms were considerable, which yielded to these alone. They may be used in three different forms, in the solid, or liquid form, or in the form of vapour. In the first form they are termed masticatoria, because they must be chewed. The pellitory root or horse-radish are used in this way. The liquid form is the least, and that of vapour the most, powerful. Most acrid vapours which are innocent may be employed; that of tobacco is among the best, but its employment requires much caution.

It has been proposed to induce salivation, by mercury received into the system, in the worst cases of ophthalmia, even where no venereal taint is suspected. The benefit derived from this practice it is to be feared would rarely compensate for the trouble attending it. But should it prove successful, its effects might with more probability be ascribed to the well known tendency of mercury to diminish the inflammatory diathesis, than to the increased secretion of saliva.

The remedies which increase the secretion from the skin of the head are more powerful. Trnka relates cases in which they suceeded after every remedy which could be thought of had failed. A general application of watry vapour to the head soon induces profuse perspiration, and if this be supported for some time, paleness of the countenance, giddiness, and at length even syncope.

It seems to be of little use to impregnate the vapour with any of the medicines used in ophthalmia, as it is not from the effects of the vapour on the eye that we expect benefit.

The manner of applying this remedy is

very simple; the patient is directed to hang the head over a large bason filled with boiling water, and a piece of flannel is thrown over his head and the bason in order to confine the vapour.

But of all local evacuations none is so effectual as blood-letting. I have already mentioned bleeding from the jugular vein as at once answering the purpose of both local and general blood-letting; the former however is more effectual when performed nearer the seat of the disease.

Opening the temporal artery has been particularly recommended in the severer cases of ophthalmia. "Opening the tem-"poral artery," says Mr. Ware, "is on all "hands allowed to be a mode of bleeding "the most effectual as well as speedy for "the purpose. The near situation of this "artery to the seat of the disease cannot "but render it peculiarly desirable that "blood should be taken from it: but here "the two following difficulties lying in the "way prevent its being generally used.

"The first is, it often happens that this artery will not yield a quantity of blood

"sufficient

"sufficent to answer the end: and the second, that troublesome and even dangerous hemorrhagies have been sometimes found to issue from the orifice, at a distance of many hours after the operation." * * *

"It has been judged necessary to make a complete transverse division of the temporal artery, which has been preferred to barely opening it, as the division would not only cause a derivation of the blood from the part affected, but must also cut off a principal source by which the inflammation was constantly fed: and in this mode of proceeding I have known great relief to be almost instantaneously given to the patient, on whom all other applications had proved ineffectual; and without any bad consequences whatever."

Will compression of the temporal artery relieve the symptoms of ophthalmia?

Of all the modes of employing local blood-letting, there is none so easy, and in general so successful, as that by leeches. They have been applied to the eye-lids, and even to the inner canthus, and it is said, that one applied to the inner canthus will often be of more service than several applied to any other part. By some however we are dissuaded from applying leeches so near the eye, as they are apt to occasion swelling of the eye-lids, and frequently even a temporary increase of the inflammation. Upon the whole, the temple or the cheek appears to be the most convenient place for their application.

Scarifying and cupping the temples or parts behind the ears are often practised with success. Scarifying the back of the head, a common practice in some parts of the Continent, is less effectual.

"But of all kinds of bleeding," Mr. Ware continues, "that which would be most ef-
"fectual, if it could be performed without
"adding to the irritation, is the still more
"topical mode of bleeding the eye itself.
"This has been attempted different ways.
"Some have scraped the conjunctiva with a
"brush made of barley-beards, while others
"have opened the inflamed vessels with
"the point of a lancet; or if one or two
"only

" only were distended, have made use of a " crooked but sharp edged needle, which " they have introduced underneath the vessels, dividing them by its edge as it cut " its way out.

" As to the first of these methods, that " of bleeding the eye with barley-beards, " though I have used it several times, I " never found any great or lasting benefit " to be produced by it. In a few instances " the pain it occasioned was very severe, " and the inflammation instead of being " lessened was afterwards increased; which I " could no otherwise account for, than by " supposing that some of the fine invisible " spiculæ were left in the eye. As no care " can prevent this accident, it seems to be " an insuperable objection to the practice.

" The two modes last mentioned may " be tried in cases where the blood vessels, " connected with a speck on the cornea, " are not to be cleared by any of the common methods which are used for the " purpose. Yet in both these modes of " practice there must always be no small " uncertainty; as the simple division of

“ the vessels has, in very many instances,
“ not been effectual so far to destroy their
“ continuity as to answer the end. This
“ has not uncommonly occurred in my use
“ of them; on which account it has been
“ necessary to take away a small portion of
“ the vessels as well as divide them. This
“ I have effected with success by the following
“ operation, and would therefore
“ recommend it to others where the two
“ former are found to fail.

“ The upper and lower lid being kept separate
“ by the hands of an assistant, the
“ vessel or vessels to be operated on must
“ be first raised by a hook or forceps in one
“ hand of the operator, while, with a
“ small pair of curved sharp pointed scissars
“ in the other, he is to cut off the raised
“ and included portion, parallel to the circumference
“ of the cornea. If the vessels
“ lie near enough to one another, two or
“ three may be operated on at the same
“ time; but as all such vessels must be divided,
“ if it cannot be done at once, the
“ operation must be repeated as often as
“ necessary, which will depend on the number

" ber of these vessels and their relative si-" tuation to one another.

" There is one other particular mode " of taking blood from the eye, which " in acute inflammation has sometimes " been very useful. In the description " of the eye prefixed to these remarks, " it has been observed, that blood-vessels, " visible in that part of the conjunctiva which covers the inside of the eye " lids, are much more numerous, than " those observable in that part of it which " covers the globe of the eye. In con-" sequence of this, it always happens in " the ophthalmy, that the inflammation is " greatest on the inside of the lids; the " blood vessels in that part being often not " only much increased in number, but also " extremely full and turgid. * * * Great be-" nefit has been derived from scarifying " them with a lancet, by means of which " a considerable quantity of blood has been " removed. When again the swelling of " the everted lids has been very consider-" able, great and speedy relief has been " given by cutting off a portion from each "of them with a pair of curved scissars; "the loss of blood consequent on this, diminishing the general swelling, while "the reduction made in the size of the lids "by the same operation, has caused them "almost instantly to return to their natural "position."

It is unnecessary to attempt any addition to these observations on the various ways of employing local blood-letting in ophthalmia. In all the more severe cases of ophthalmia, local and general blood-letting are the remedies on which we chiefly rely. "Nam ab initio," Boerhaave* observes, "sanguis mittendus est, cum id postea fieri "non possit, inflammatione enim ad suppurationem nunc disposita oculus jam "perditus est." Draw blood therefore, he adds, whether your patient be an infant or an old man, and let the blood-letting be repeated at certain intervals according to the degree of plethora and the urgency of the symptoms.

However powerful in most cases, blood-letting will not always succeed. Boerhaave says he has even seen syncope induced by blood-letting in ophthalmia, and yet the violence of the symptoms little abated. In the more violent cases therefore we should not trust to this evacuation alone, but after the first or second blood-letting, especially if the symptoms are not much relieved, apply a blister to some neighbouring part.

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* Boerhaave's Treatise de Morbis Oculorum.

The temples, or parts behind the ear, are the best places for its application. If applied between the shoulders, which is a common practice, it must be very large to be of much service. In obstinate cases it is sometimes proper to shave the head and apply a large blister over it. Boerhaave talks of blistering as a doubtful practice in ophthalmia, and if blisters be employed early in cases attended with fever, they may do harm, as in the other phlegmasiæ, by increasing the vis a tergo; but in the majority of cases, in which ophthalmia is merely a local affection, blistering may be employed early; we still however begin with blood-letting, because its effects are more speedy.

In this, as in all inflammatory affections of for the purpose of exciting the debilitated vessels.

Certain eye washes, or as they are termed by medical writers, collyria, have been thought peculiarly adapted to certain kinds of ophthalmia. The opinions on this part of the subject however appear to be too ill established to warrant any division of this kind, the generality of practitioners admitting that nearly the same collyria may be employed in most species of the complaint.

It is true indeed, that some affirm they have found certain collyria most useful in certain species of ophthalmia, but the observations of such writers, so far from agreeing, contradict each other. I shall therefore divide the substances employed in the composition of collyria, not according to the species of ophthalmia to which they are best adapted, but according to the nature of the substances themselves; and the only division which will be necessary is that of vegetable and mineral; the division of collyria into stimulant and sedative, adopted by various writers, being merely hypothetical.

Opium and the various fermented liquors afford some of the most powerful collyria derived from the vegetable kingdom. Distilled spirits properly diluted, or what are preferable, some of the astringent wines, which, if strong, must also at first be diluted, are often effectual.

The addition of opium to the wine however renders it far more powerful. Mr. Ware was the first who proposed, or at least generally employed, this application in ophthalmia, which, from the trials I have made of it, appears to me, particularly in the ophthalmia membranarum, to be one of the best remedies we possess. Mr. Ware's observations on this remedy are well deserving of notice.

" I would particularly recommend," he observes, " the thebaic tincture of the " London dispensatory; a medicine com" posed of opiates and warm aromatics dis" solved in mountain wine. The power of " opium, when inwardly taken, to ease pain " and induce sleep, has been long known; " but its external use is absolutely forbidden

" by some of the most respectable of the " medical profession." * * *

" Authors have said, that blindness and " deafness were caused by its application to " the eyes and ears. Experience however " makes directly against these assertions, " and proves beyond contradiction the great " efficacy of its outward use in a variety of " cases. In the ophthalmy particularly, " I have found the thebaic tincture,* " wherein opium is the principal ingredient, " to be eminently serviceable: and the " mode in which I have applied it has been " to drop one drop of it into the eye, once " or twice a day, according as the symp- " toms were more or less violent.

" When first applied it causes a sharp " pain, accompanied with a copious flow of " tears, which continues a few minutes, " and gradually abates; after which a great " and remarkable degree of ease generally " succeeds.

" The inflammation is often visibly abated " by only one application of this tincture,

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* Namely, the tincture prepared with wine.

" and many bad cases have been completely " cured by it in less than a fortnight, after " every other kind of remedy had been used " for weeks and sometimes months without " any success. But this speedy good ef- " fect is not to be expected in all cases in- " discriminately. In some the amendment " is more slow and gradual, requiring the " tincture to be made use of for a much " longer time; and a few instances have " occurred, in which no relief at all was " obtained from its application. In cases " of the latter kind, in which the com- " plaint is generally recent, the eyes appear " shining and glossy, and feel exquisite " pain from the rays of light.

" However, notwithstanding these symp- " toms, the application is sometimes found " to succeed; and whether it will or not " can only be determined by making the " trial, which is attended with no other " inconvenience than the momentary pain " it gives. When it is found to produce " no good effect, the use of it must be " suspended, until evacuations and other " proper means have diminished the ex-

" cessive irritation; after which it may again " be applied, and bids equally fair for success " as in those instances in which it never " disagreed.

" Though I have said that opium is the " basis of the thebaic tincture, it is yet ne- " cessary to observe, that the manner in " which it is here prepared, is that on which " its efficacy not a little depends. I have " several times applied a strong solution of " opium in water without any success. " The pain indeed was sometimes lessened " for a while, but the inflammation always " remained in its full force, as if nothing " had been done. A fomentation made " with poppy-heads and applied warm has " been found comfortable to the diseased " part, and in slight attacks of this disorder " has been sufficient to remove it; but in " more obstinate cases, it has been re- " peatedly found ineffectual till the tincture " itself was used.

" That I might judge still more certainly " what it was in the thebaic tincture that " caused its utility, I have also once or " twice made the experiment of the sole

" application of the other principal ingre-
" dient, which is mountain wine. But this
" I found, while it produced a still stronger
" irritation in the eye, and of much longer
" continuance than the tincture, was fol-
" lowed with no kind of benefit.

" Having thus satisfied myself that nei-
" ther of the ingredients in their separate
" state was able to give the relief which
" they uniformly did when combined in the
" tincture, I have for a long time past con-
" fined myself to the use of the latter, and
" am warranted from repeated experience
" to recommend it.* * *

" As there is some variation in the direc-
" tions of different dispensatories for mak-
" ing this tincture, it is necessary to be
" noticed, that the preparation I have used,
" and which is in common use here, is that
" of the London dispensatory. Nor is any
" farther caution wanting as to the appli-
" cation of it, but that should it be found
" too hot for the eye, which there will
" always be reason to apprehend, when the
" patient, instead of being relieved, suffers
" more violent continued pain after than he

" did before the use of it, it must then be
" corrected by the infusion of an additional
" quantity of opium; and with this altera-
" tion it has been known to succeed in most
" of the instances in which it had at first
" failed."

The heads of poppies boiled in milk have long been employed as a collyrium, and are frequently successful in slight cases.

Camphor and other essential oils are occasionally employed; the same may be said of the balsams and fetid gums, particularly the gum galbanum. A solution of the extract of the flores sambuci or of camomile flowers, the diluted juice of onions, a decoction of fenugreek seeds, of nutmeg, and many other gently acrid fluids, are sometimes used with advantage. All these collyria however are of comparatively little efficacy.

Those prepared from the more astringent vegetable substances, oak bark or galls, are sometimes more successful. The gently astringent waters, such as that of roses, form a good vehicle for more active ingredients.

Of the collyria derived from the vegetable kingdom, vinegar is among the most powerful. It may be used merely diluted with water, but is generally combined with some metallic preparation, particularly the preparations of lead, the powers of which it seems considerably to increase.

When the discharge from the eye is considerable and appears to be acrid, whatever other properties the collyria have, they should be mucilaginous. A little gum arabic may be added to them, or they may be prepared with an infusion of the roots or leaves of the marsh mallow, which are supposed to be otherwise useful in ophthalmia.

If we except the preparations of opium, the collyria afforded by the mineral kingdom are more powerful than the foregoing, particularly the preparations of mercury, lead, zink, and copper. The muriate of mercury, the acitate of lead, and the sulphates of zink and copper, are the preparations generally employed.

Alum is also used with advantage, especially where the inflammation has become habitual. Many of the salts, particularly nitre and sal ammoniac, are sometimes serviceable

viceable. Some of these, as well as the metallic preparations, have at the same time been used internally, particularly the muriate of mercury and sal ammoniac, and occasionally with advantage. I have known a case of habitual ophthalmia which had resisted every other remedy, yield to the internal use of sal ammoniac; and there is reason to believe, that the muriate of mercury taken internally is often serviceable where there is no venereal taint.

To return from this digression: metallic preparations are often advantageously employed in the form of a paste. The tutty-stone, an argillaceous substance impregnated with zinc, or what is called the calaminaris lapis, an ore of the same metal, finely powdered and made into soft paste with rose or plantain water, or what is generally preferable, port wine, makes a good application. Calomel is often used in the same way, particularly where the tarsi are much affected.

Of the proportion of the metallic preparation in such applications, nothing need be said. In the collyria where the metallic preparation is dissolved, the proportion demands particular attention; and injury is sometimes done by making it too large, particularly at an early period. From one to two or three grains of any of the foregoing metallic preparations, for each ounce of the collyrium, is the best proportion to begin with.

Such are the principal substances employed in the composition of collyria; it would be endless to enumerate all that have been used. In Boerhaave's Treatise "De Morbis Oculorum," and some others on this complaint, the reader will find very complex formulæ for collyria, which do not seem, however, to have any advantage over the more simple forms now commonly employed.

Complex formulæ should always be avoided, except where some very considerable advantage is expected from them, as they tend constantly to render the practice feeble and uncertain: Uncertain, because where the medicines employed are numerous, it is often impossible to say to which the effects are to be ascribed: Feeble, because

cause this uncertainty prevents our pushing to the proper extent the medicine from which the favourable change, if such has taken place, proceeds. In simple formulæ the effects of any ingredient are readily perceived, and according to these we increase or diminish the dose, or have recourse to some other medicine. The simplification of formulæ indeed is one of the greatest improvements which the practice of medicine underwent during the last century.

There is some difference of opinion respecting the proper temperature of collyria. Hoffman and some other writers advise them to be applied tepid; the generality of practitioners use them cold. It would appear that when the symptoms are not very considerable, cold collyria are most beneficial. When the inflammation is violent, very cold collyria may increase the tendency to gangrene; when this tendency is apparent, the collyria must always be tepid.

The medicines we have been considering are sometimes used in other forms. It has already been observed, that it is often proper to employ ointments to prevent the tarsi being glued together, and to defend the inflamed parts from the acrid exudation which frequently attends ophthalmia, particularly the ophthalmia tarsi. These ointments are made to serve a double purpose, by impregnating them with some of the foregoing substances. The metallic preparations in particular are frequently employed in this way. The unguentum hydrargyri nitrati is one of the most powerful remedies in the ophthalmia tarsi.

Sir Hans Sloan's celebrated ointment for ophthalmia is the unguentum tutiæ and the sulphate of zinc rubbed with butter. Sir John Pringle reccommends the acitate of lead rubbed with the white ointment and a little of the traumatic balsam.

The applications to the eye are sometimes made in the form of poultice, which is by far the most exceptionable; the effects of the ingredients being generally more than compensated for, by the increase of temperature occasioned by the poultice. If medicated poultices are inadmissible, those which are merely emollient are still more exceptionable.* Both the one and the other indeed are now very generally abandoned.

The only case of ophthalmia perhaps in which poultices are proper, is where an evident tendency to gangrene has taken place; then warm emollient and astringent poultices are serviceable. If there is any other case of ophthalmia where poultices are proper, it is in the ophthalmia tarsi after suppuration, leaving small ulcers of the tarsi which do not readily heal. If the poultice is not found to increase the inflammation, or make it spread to the eye, it will often be serviceable. There is no poultice we can apply however so generally successful in such cases as the unguentum hydrargiri nitrati. Other escharotics, the application of which requires great caution, are occasionally employed when the ulcers prove obstinate, and it is sometimes judged proper to lay open the spaces between the small ulcers with a scalpel; but all such cases come under the department of the surgeon.

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* "I knew an instance where by the repeated application of an injudicious poultice a suppuration of "the eye was brought on, which had nearly proved "fatal." Mr. Rowley's Treatise on Ophthalmia.

There is still another way of employing the substances used in collyria, in the form of vapour. The high temperature and irritation attending the employment of vapours however, notwithstanding they are strongly recommended by some respectable practitioners, generally more than counterbalance any advantage to be expected from them.

One application remains to be mentioned, which cannot be arranged under any of the foregoing heads; electricity is frequently employed in languid habitual ophthalmia, but rarely with success. I have often seen it used without benefit, and have conversed with old practitioners who had never met with one case of ophthalmia in which any considerable advantage was derived from it. " Its beneficial effects," Dr. Cullen observes, " are seldom permanent, and even " its frequent repetition seldom produces an " entire cure."

The mode of applying electricity is very simple. Sparks, not shocks, should be taken, and the sparks should at first be very gentle. I have seen a very languid ophthalmia evidently increased when the sparks were severe; it is proper however to use a large machine, that they may succeed each other rapidly. The patient's feelings will best regulate the strength of the sparks. If he cannot bear sparks of any strength, the stream must be directed on the eye by the pointed wood held at some distance from it; if even this be too severe, it must be directed by a sharp metallic point held at a greater distance from the eye.* In short, electricity must be exhibited in such a form that its application may be continued for some time.

Such are the various means employed in ophthalmia. It appears from what has been said, that in different cases they are to be variously combined. The treatment should always commence with the use of a collyrium, and as those containing metallic preparations are most generally successful, they should be first employed. In moderate cases of ophthalmia membranarum, these, with gentle laxatives, are in general the only remedies necessary.

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* See the works of Cavallo and others on Medical Electricity.

If the inflammation resists the common collyria, the tincture of opium, prepared and employed as Mr. Ware recommends, should be had recourse to. If the tarsi are affected, it will be proper to employ at the same time some of the ointments above mentioned; those will be found most generally successful which contain some metallic preparation.

If the symptoms are not severe, the use of the collyria and ointments should be continued for some time before we employ other means, because, although the symptoms do not at first remit, they often yield to their continued application, and the other means employed in ophthalmia are more troublesome and debilitating. When however the symptoms are more severe, or have been of long standing, we must at the same time have recourse to other remedies.

Local blood-letting generally affords the most immediate, blistering the most permanent, relief. If the symptoms are very considerable, both are necessary; then, although there be no fever, the local blood-letting should precede the application of the blister.

When ophthalmia produces fever, it is a true phlegmasia; all the general means employed in the phlegmasiæ are then to be conjoined with the local remedies, and properly adapted to the degree of fever present.

Upon the whole, the best rule in the treatment of ophthalmia is, as far as we can, to depend on the simplest remedies, those which put the patient to least trouble, and tend least to debilitate; and as the disease increases or becomes obstinate, to have recourse to a more complicated practice.

When we have succeeded in removing ophthalmia, it is often necessary to use means to prevent its return; on the use of issues for this purpose, I have already had occasion to make some observations. But ophthalmia seems often connected with a debilitated habit, and then the best means of preventing its return are those which tend to strengthen the vessels of the eye or the system in general, and such means will sometimes even remove habitual ophthalmia when all others have failed.

One of the most powerful of these is the cold bath, which may be employed either by immersing the whole body, or letting the water fall suddenly on the head, which for the prevention or cure of ophthalmia is perhaps the best mode of using the cold bath. Shaving the head and merely applying to it every morning a cloth dipt in very cold water, and even applying cold water to the eyes themselves or behind the ears, are serviceable in preventing the return of ophthalmia, or removing it after it has become habitual.

For the same purposes the bark and wine have often been successfully employed.

Ophthalmia has sometimes accompanied the fits of an intermittent ceasing during the apyrexia, and has sometimes continued to recur at certain intervals after the fever has been removed. In both these cases the bark given during the intervals is the best means to prevent its recurrence.

A variety of other medicines have been employed internally to prevent the return of ophthalmia, and for the removal of the chronic form of the disease; the cicuta, flores arnicæ montanæ, &c. Little however is to be expected from them. The German leopard's bane has been of little or no service in many complaints in which it has been celebrated, and therefore we are led to question any effects attributed to it.

With regard to the various consequences of ophthalmia enumerated when treating of the symptoms of this complaint, as they come under the department of the surgeon, their treatment is not to be considered here.

CHAP. VIII.

Of Otitis and Odontalgia.

INFLAMMATIONS of the ear and of the teeth and neighbouring parts, like inflammation of the eye, are for the most part unaccompanied by fever, the latter indeed almost uniformly so, and rather belong therefore to simple inflammations than to the plegmasiæ. As they are generally unattended with danger, it will not be necessary to consider them at length.

Very few nosologists, for what reason it does not appear, have admitted Otitis into their systems, which is the more remarkable, because, although while unaccompanied by fever, if we overlook the sufferings of the patient, which even in this case are often great, it is a complaint of little importance; when attended with fever, it often assumes a very formidable appearance, delirium, coma, and convulsions sometimes supervene, and it has even terminated fatally.

Vogel has given it a place in his nosology. It is his 48th genus, and the 4th of the complaints termed inflammatoriæ. He defines it,

"Inflammatio auris internæ dolor immanis in aure, febris, cephalalgia, agrypnia, delirium."

According to the mode of arrangement we follow, it may be defined,

Phlegmasia cum dolore auris internæ, sæpe cum delirio.

This definition, it is evident, applies only to otitis accompanied with fever.

Otitis is produced by the same causes with other inflammations, by none more readily than partial exposure to cold.

In the treatment of otitis we proceed on the same principles as in that of ophthalmia. While it is merely a local affection, local remedies alone are necessary, if we except gentle cathartics for the purpose of removing any cause of irritation lodged in the primæ viæ. Local blood-letting, and blisters applied behind the ear, are the means to be chiefly relied on. As the inflammation is confined to the external parts, warmth applied at an early period to the internal ear and its neighbourhood often brings relief.

If the pain is not soon abated, and still more if it continues to increase, we may expect suppuration. When however the pain has been confined to the ear, and there is little or no fever, suppuration is not to be dreaded. When the abscess bursts, the matter is discharged by the meatus auditorius externus. It is then proper to syringe the ear from time to time with some mucilaginous and gently astringent decoction.

The treatment must be very different when the pain spreads from the ears over the whole or a great part of the head, attended with fever, and still more if delirium, coma, and convulsions supervene. It may then, Vogel observes, prove fatal even on the first day, and very often destroys the patient before the seventh.

The most powerful local and general means are then to be combined. In such cases there is reason to believe that the inflammation has spread to the brain, and the treatment is the same as in phrenitis.

Even the most violent forms of otitis however more frequently terminate in suppuration than in death, and if the brain has partaken of the inflammation, the suppuration of the ear generally relieves it.

But suppuration is more formidable in the more violent, than in the milder cases of otitis. The structure of the whole internal ear is often destroyed, the bones being discharged through the meatus auditorius with much purulent, and often fetid

matter.

matter. It is almost unnecessary to observe, that in such cases the sense of hearing in the ear affected is wholly lost.

Fistulous ulcers of the internal ear are sometimes the consequence of suppuration, which prove very troublesome, and may even be fatal by spreading to the brain.

Most nosologists have given a place to Odontalgia. It is Dr. Cullen's 23d genus, and the 17th of his phlegmasiæ. He defines it,

" Rheumatismus vel arthrodynia maxilla-
" rum a carie dentium."

The tooth-ach is so rarely attended with fever, that there is no form of it which can be regarded as a phlegmasia. It belongs entirely to the class of local diseases.

Sauvages makes seven varieties of tooth-ach, dividing it according to the causes which produce it. 1. Odontalgia from a carious tooth; 2. from scurvy; 3. from catarrh; 4. from gout; 5. from child-bearing; 6. from an histerical habit; 7. from affections of the stomach. Besides these, tooth-ach tooth-ach may arise from any of the causes of inflammation.

I have known it so intimately connected with the state of the stomach, that for two months it constantly returned on the patient's taking any solid food. Even one mouthful of bread was sufficient to occasion such a paroxysm of pain, which generally continued from half an hour to two or three hours, that he was almost starved, being supported solely by strong soups and other fluids, no quantity of which he found capable of affording sufficient nourishment, or even of allaying the calls of hunger. It was observed in the first volume, that fluids, however nutricious, if unmixed with any solid matter, are very imperfectly digested.

As tooth-ach is merely a local affection, local remedies alone are for the most part necessary; and these are so generally known that it is needless to point them out here.

Where the tooth is apparently sound, a large dose of opium may be tried previous to extraction. This will always afford temporary relief, and by promoting the perspiration, if the complaint rather proceeds from cold than any fault of the tooth, will often entirely remove it. A small dose, by quickening the circulation, often does more harm than good. When tooth-ach arises from the state of the stomach, an emetic will frequently give relief, and in such a case as that just alluded to, where it has become habitually connected with the state of the stomach, stomachic medicines, particularly bitters and steel, afford a probable chance of a cure.

The means of preventing the tooth-ach, which is always sooner or later attended with decay of the teeth, demand serious attention. I believe they may all be arranged under three heads, cleanliness, means of obviating the effects of cold, and those of strengthening the gums.

To keep the teeth perfectly clean, they should after every meal be freed of the small pieces of aliment which often lie between them, till they putrify, and thus hurt the enamel. The concretion which is apt to form on the teeth should be prevented by carefully brushing them, and as soon as any appears it ought to be removed.

The effects of cold on the teeth are best obviated by habituating them to its application, which may most effectually be done by washing the mouth repeatedly every morning with cold salt and water.

If the tendency to tooth-ach proceeds from a fault in the gums, this must be corrected by strengthening the system in general, and frequently washing the gums and applying to them astringent powders. The powder of bark is one of the best.

CHAP. IX.

Of Cynanche.

DR. CULLEN defines cynanche, which is his 10th genus, and the 4th of his phlegmasiæ,

"Pyrexia aliquando typhodes; rubor et "dolor faucium; deglutitio et respiratio "difficiles, cum angustiæ in faucibus sensu."

This complaint he divides into five species, in all of which the symptoms, and in some the mode of treatment, are very different. These differences arise partly from the nature of the organs affected in the different species of cynanche, and partly from less evident causes.

Dr. Cullen's first species is the cynanche tonsillaris, which is defined,

"Cynanche membranam faucium mucosam et præcipue tonsillas tumore et rubore afficiens, cum febre synocha."

Dr. Cullen's second species I had frequent occasion to mention in treating of the scarlatina, the cynanche maligna. It is defined,

"Cynanche tonsillas et membranam faucium nucosam afficiens tumore, rubore, et crustis mucosis coloris albescentis vel cineritii, serpentibus et ulcera tegentibus; cum febre typhode et exanthematibus."

Dr. Cullen's third species of cynanche, the cynanche trachealis, he defines,

"Cynanche respiratione difficili, inspiratione strepente, voce rauca, tussi clangosa, tumore fere nullo in faucibus apparente, deglutitione parum difficili et febre synocha."

The fourth species is the cynanche pharyngea.

" Cynanche cūm rubore in imis præsertim " faucibus; deglutitione maxime difficili, " dolentissima; respiratione satis commoda " et febre synocha."

The last species, the cynanche parotidœa, is defined,

" Cynanche cum tumore externo parotidum " dum et maxillarum glandularum magno; " respiratione et deglutitione parum læsis; " febre synocha plerumque leni."

The only alterations I would propose in those definitions, are to suit that of cynanche to the mode of arrangement I follow, and to include in the definition of the cynanche tonsillaris that of cynanche pharyngea. These varieties of cynanche differ considerably when they are exquisitely formed. But the one is seldom present in any considerable degree without being attended with more or less of the other. Dr. Cullen declares indeed that he never saw a case of the true cynanche pharyngea, that is, a case in which the inflammation was confined to the pharynx; it constantly spread in a greater or less degree to the tonsils and neighbouring parts. Besides, the mode of treatment is in almost every instance the same in both cases. And it will appear, from what is about to be said of the symptoms of these forms of cynanche, that if we admit the cynanche pharyngea to be a distinct variety, we must admit another, the cynanche œsophagea, for the inflammation we shall find frequently attacks the œsophagus, and is sometimes even confined to it.

The following may be assumed as the definition of cynanche:

Phlegmasia pulsu plerumque valido et duro, nonnunquam debili, cum rubore et dolore faucium, respiratione et deglutitione difficili, cum angustiæ in faucibus sensu.

The first species of cynanche then, according to the mode of arrangement I shall follow, includes the inflammation of the tonsils, velum pendulum, uvula, pharynx, and œsophagus. As the tonsils are the parts in most cases principally affected, and it is rare for the others to be affected without some affection of them, we may, for the sake of brevity, assume the term cynanche tonsillaris to express the inflammation of all these parts; which may be defined,

Cynanche, membranam faucium et pharyngis mucosam præcipue tonsillas tumore et rubore afficiens, deglutitione difficili nonunquam dolentissima, pulsu valido et duro.

The only alteration, which the mode of arrangement I follow renders necessary in the other definitions, is to insert, pulsus validus et durus et pulsus debilis, instead of synocha et febris typhodes; symptomatic fevers, according to that mode of arrangement, forming a class of diseases distinct from the idiopathic.

SECT. I.

Of the Cynanche Tonsillaris.

1. Of the symptoms of the cynanche tonsillaris.

THE cynanche tonsillaris generally begins with an uneasy sense of tightness about the fauces, which, when the inflammation

mation occupies the pharynx, is deeper seated than when it occupies the tonsils and neighbouring parts.

The deglutition soon becomes more or less difficult and painful; in the former case more so than in the latter, for, while the inflammation is confined to the tonsils, velum pendulum palati, and uvula, the pain is rather while we are preparing to swallow, or in the very first act of swallowing, than during deglutition. In most cases however, more or less of the inflammation spreads to the pharynx, and then the pain peculiar to both forms of the complaint is perceived.

On inspecting the fauces, the parts, as far as the inflammation extends, appear swelled and of a more florid red than natural, and here and there, particularly on the tonsils, small white or yellow specks are often observed. While these remain of a light colour, and the pulse continues sufficiently strong and full, they never indicate danger.

The inflammation is generally confined to the parts which can be brought into view; it sometimes however extends along the œsophagus, which is known by the greater difficulty and pain of swallowing as well as by the seat of the pain. In some rare cases, we have just seen, the inflammation is wholly confined to the œsophagus. In these no morbid appearance presents itself on inspecting the fauces.

Whether the œsophagus be primarily affected, or the inflammation has spread to it from the fauces, it is a very alarming accident. Cases have occurred in which, the cavity of the œsophagus being wholly obliterated by the swelling, the patient has been literally starved to death. Even in less violent cases the pain of swallowing is sometimes such, that the patient abstains from aliment, and some have sunk under the debility thus occasioned.

The deglutition is now and then impeded by the inflammation's spreading in an opposite direction. It is not very common for the tongue to be affected in cynanche; in some cases however it has been so much swelled as to fill the mouth and wholly prevent deglutition, nay, it sometimes, Tissot observes, becomes too large to be retained in the mouth, and is thrust out assuming a purple colour.

The pain during deglutition in cynanche seems often in a great degree to depend on the muscles employed in deglutition partaking of the inflammation; hence it seems to be, that fluids, contrary to what we should, a priori, suppose, are swallowed with more pain than solids; in the former case, a greater number of muscles being employed, and those employed in both cases acting more powerfully. The patient feels most difficulty in swallowing the saliva, partly owing to its being a fluid, and the quantity being small, and partly to its becoming more viscid than natural.

In some cases however the saliva becomes thinner than natural, and is poured out in great quantity. This increased flow of saliva, although it often relieves the symptoms, sometimes proves a source of much uneasiness. If the inflammation runs high, the exertion of spitting it out is attended with considerable pain; and when the inflammation, as happens in all the severer cases of cynanche tonsillaris, extends

tends to the pharynx, the pain of swallowing it is much greater.

When the inflammation is very considerable indeed, especially when it extends to the œsophagus, the pain of swallowing the thin saliva is sometimes such as to throw the patient into convulsions;* and what adds to his distress is, that to avoid swallowing it is not always optional, for the irritation it occasions frequently excites involuntary attempts to swallow. This is particularly apt to happen during sleep, as the saliva is then permitted to accumulate in the fauces, and it is generally owing to this cause, that the patient often starts with horror from his sleep. In such cases the only situation in which he finds relief is lying with the head over the bed, and permitting the saliva to run from the mouth.

This symptom often prevents sleep; but

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* Tissot says he has seen women in this complaint thrown into convulsions from excess of pain every time they attempted to swallow the saliva. In the 3d vol. of the Physical Essays the reader will find a case related by Dr. Monro, which in a striking manner exemplifies this symptom.

many are of opinion, that sleep, where the throat is much inflamed by permitting the morbid secretion to accumulate in it, is injurious, and it is certain that during sleep this complaint seems often to gain ground. Tissot says that the irritation of the saliva is not hurtful by preventing sleep, which he has often observed to do much harm, those who had been almost well becoming, during some hours of sleep, nearly as ill as ever.

The irritation occasioned by the accumulation of mucus in the throat often excites frequent attempts to vomit, which may be mistaken for an indication of a foul stomach.

The pain is generally greatest when the patient attempts to swallow lying on the back; and when the œsophagus is much affected, the pain is often felt chiefly in the back, and is of the same kind with that produced by any acrid or bulky substance passing along the œsophagus, which most people have experienced.

If the pharynx is much affected, and still more if the complaint has spread to the œsophagus, when the patient attempts to drink, the fluid, instead of passing to the stomach, is often returned by the mouth, thrown through the nose, or into the wind-pipe, exciting a violent fit of coughing.

The inflammation in cynanche is not apt to spread to the stomach. I had occasion to observe, in speaking of erysipelas, that that species of inflammation sometimes spreads along the œsophagus to the stomach; but erysipelas of the fauces, which is more uniformly diffused, generally of a darker red, and attended with little swelling, has a very different appearance from the cynanche tonsillaris.

When the inflammation spreads to the trachea, the danger is very great. It may then occasion suffocation. But the inflammation of the wind-pipe forms a distinct species of cynanche according to the foregoing division; at present therefore it would be improper to enter farther on its symptoms; it is sufficient to have remarked that we may sometimes look for a concurrence of these forms of cynanche.

But although the inflammation spread no

farther than the fauces properly so called, the breathing is often considerably affected. The more, we have seen, the complaint partakes of the cynanche pharyngea, that is, the more the inflammation spreads towards the œsophagus, the more difficult is the deglutition; it is the reverse with respect to the respiration, for if the inflammation be wholly confined to the pharynx and œsophagus, however violent it may be, the breathing is always free, but when the chief seat of the complaint is in the tonsils, velum pendulum palati, and uvula, the passage of the air to the lungs is much contracted, and sometimes almost closed; that by the nose frequently is so, and the patient can only breathe with the mouth open.

In such cases it might be imagined that deglutition is wholly interrupted. This however very rarely happens, except where the tongue partakes considerably of the swelling, the tonsils, velum pendulum palati, and uvula being very compressible.

The voice is often affected, becoming hoarse, being sometimes almost lost, especially where the swelling is considerable.

The affection of the voice however is rather a symptom of the cynanche trachealis than tonsillaris, and never attends the exquisitely formed cynanche pharyngea or the cases in which the inflammation is confined to the œsophagus.

None of the neighbouring parts partake so frequently of the pain in cynanche as the internal ear. The patient, for the most part, at first complains of a ringing in the ear, and a sense of rattling in it when he swallows, which often becomes a severe pain. There is reason to believe that the inflammation frequently spreads along the eustachian tube; in many cases the pain can be distinctly felt extending through it to the internal ear. A degree of deafness which frequently attends violent cases of cynanche is probably owing to the swelling occasioned by the inflammation's obliterating this cavity. If the deafness is complete, as sometimes happens, it must arise from some other cause, or some other in conjunction with this.

When the symptoms of cynanche are very considerable, the whole face partakes of it, the eyes are inflamed, the cheeks swelled and florid. I have already had occasion to observe, that the muscles employed in deglutition generally partake of the inflammation; in the more violent cases it often spreads to almost all the muscles and more external parts of the neck, which become stiff, hard, swelled, and sometimes red, and the sublingual and other glands in the neighbourhood are often considerably enlarged. This affection of the external parts frequently relieves the internal. The swelling which appears externally however, in many cases, proceeds not from the disease spreading to neighbouring parts, but from the swelling of the internal fauces. The enlarged tonsils in particular may often be perceived externally.

Many of the foregoing symptoms appear only in the more severe forms of the disease. In mild cases it is common for the inflammation to be chiefly confined to one of the tonsils at the commencement, and to leave this tonsil, or in some measure to leave it, when it attacks the other.

Such are the local symptoms of cynanche tonsillaris,

tonsillaris. It appears from what has been said, that the difference between the symptoms of cynanche occupying the tonsils, velum pendulum palati, and uvula, and that occupying the pharynx, consists chiefly in the former being often attended with some difficulty of breathing, on account of its having its seat in the passage which the air takes to the lungs; and in the latter being attended with more difficulty of swallowing, from its affecting parts more essentially concerned in the act of deglutition.

In cynanche pharyngea, we have seen, the inflammation sometimes spreads to the œsophagus, and the deglutition is wholly interrupted. On this account the cynanche pharyngea is a more dangerous complaint than the cynanche tonsillaris strictly so called. For the most part, it is only as the latter shews a tendency to be accompanied by the former, or by the cynanche trachealis, that it is attended with much danger. It is very rare for the swelling of the tonsils, velum pendulum, and uvula, to increase till it occasions suffocation. This however has sometimes happened.

The foregoing symptoms are seldom present to a considerable degree without being attended with symptoms of general derangement. In the mildest cases of cynanche tonsillaris the fever is hardly perceptible, and it never is so considerable, in proportion to the local symptom in this form of cynanche, as in the cynanche trachealis and maligna.

In proportion as the inflammation spreads towards the œsophagus, the febrile symptoms are more considerable. But the local symptoms never run high in any form of the complaint without the pulse becoming stronger, harder, and more frequent than natural; and all the usual symptoms of fever generally soon shew themselves. The thirst is often very considerable in proportion to the other febrile symptoms, particularly when the œsophagus is inflamed.

It sometimes though very rarely happens, that the febrile symptoms run so high as to endanger life. Even delirium and coma sometimes supervene. Whether in such cases the brain or its membranes are affected (which there is reason to believe) has not been determined.

Those who have seen only the more common cases of cynanche tonsillaris, can form little idea of the appearance which it sometimes assumes. As the return of the blood, Boerhaave observes, is obstructed in the external jugulars by the swelling of the neighbouring parts pressing on them, and he might have added as Van Swieten has done, in all the veins of the neck by the dyspnœa impeding the passage of the blood through the lungs, a swelling of the face, tongue, lips, and fauces is the consequence; the tongue is thrust out, distorted, and inflamed; the eyes are red, swelled, frightfully staring, and pushed from their sockets; the brain is compressed and overpowered, the sight, hearing, and touch being impaired. In some cases the patient becomes delirious, lies with the mouth open, snores, and is obliged to be supported in nearly an erect posture to prevent suffocation. There is frequently also, he continues, redness, swelling, pain, and pulsation in the external fauces, neck, and even breast; hence, he adds, the jugular veins with those of the forehead and under the tongue become distended with varices.*

The cynanche tonsillaris, like other inflammations, may terminate in resolution, suppuration, gangrene, or schirrus. The two former are common, the two latter very rare.

Resolution is at all times a favourable termination, and, in the present case, suppuration, although troublesome, is seldom attended with danger. If indeed the suppuration of the fauces is very general, even although the trachea is not affected, the matter may be suddenly poured into it, and induce suffocation, which, Van Swieten and others assert, sometimes happens; it is so rare an accident however that it is hardly to be feared.

When suppuration takes place, the febrile symptoms abate, the throat becomes paler and less painful, and sometimes a sense of pulsation is felt, or if it has been present at an earlier period, becomes more sensible. We know that the abscess is ripe by a

* Aph. Boerh.

small white soft tumor appearing about the centre of the inflamed parts.

The quantity of pus discharged from such abscesses is often very considerable, and sometimes of an almost intolerable taste and smell.

The abscess sometimes points at a more concealed part; the surgeon must then feel for it with the finger, when there is reason to believe it formed. There is alwas reason to suspect the presence of an abscess, when the patient, after the febrile symptoms are abated, experiences a considerable difficulty of swallowing although the inflammation is evidently diminished, is restless and complains of a general pain in the mouth, with slight and irregular shiverings. The pulse, Tissot observes, is then soft without being natural, there is a sense of weight in the tongue, small white spots often appear on the gums and inside of the cheeks, and the patient complains of a disagreeable taste and smell.

"Cynanche tonsillaris," Dr. Cullen remarks, "hardly ever terminates by gan-"grene, although in this disease some

" sloughy spots, commonly supposed to be " the forerunners of gangrene, sometimes " appear upon the fauces." By other writers however who seem to have met with the complaint in a more violent form, gangrene is regarded as rather a more frequent occurrence.

When gangrene does supervene in the cynanche tonsillaris, the event is almost always fatal. How shall we, says Van Swieten, support the patient's strength when the organs employed in deglutition are destroyed by gangrene, and the adjacent parts affected with that inflammation by which nature attempts to separate the dead from the living parts ?

Like suppuration, the gangrene is sometimes situated in parts which cannot be brought into view. From the course of the complaint however, and the state of the symptoms in general, we may always readily determine its presence.

When gangrene is about to succeed, Dr. Mead * observes, the tonsils and neighbour-

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* Monità et Præc. Med. cum notis Wintringhami.

ing parts, which a little before were tense, red, full of moisture, swelled, and shining, now suddenly appear flaccid, dry, unequal, pale, brown, livid, and as if they had been bruised. The pulse, in the mean time, loses its strength, and subsultus tendinum, coldness of the extremities, a clammy cold sweat, great anxiety, foam in the mouth, a degree of coma, and wandering of the mind appear, and may be regarded as the forerunners of death.

Upon the whole, when both the local and general symptoms have been unusually violent, and the means employed have failed to procure any considerable remission; when the pain and inflamed appearance of the fauces are suddenly diminished, the deglutition rendered easier, the pulse from being strong becomes small, weak, and irregular, the face assumes a cadaverous appearance, the extremities become cold, and the breath fetid, although we cannot perceive the gangrene, we may be assured that it has taken place.

The cynanche tonsillaris still more rarely terminates in schirrus.* Tissot observes that he has seen the cynanche tonsillaris terminate in mortification or schirrus when treated with heating medicines, in order to force out sweats, but that this complaint, if properly treated, never terminates in either of these ways.

Like other febrile diseases, cynanche is sometimes relieved by a critical discharge, a flow of sweat, or a diarrhœa. The increased flow of saliva is sometimes so great, and attended with such relief, as to deserve the name of critical. Dr. Sims † observes that it generally comes to its height on the fifth or sixth day.

2. Of the Causes of Cynanche Tonsillaris.

Like the other phlegmasiæ, the cynanche tonsillaris is most apt to attack the youthful, robust, and plethoric, especially those of a sanguine temperament. It is a remark of

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* Mead's Mon. et Præc. Med. cum Notis Wintringhami, vol. i. Quarin de Feb. Aph. Boerhaav. cum Com. Van Swiet. de Angina.

† Dr. Sims on Epidemic Diseases.

Sydenham, that those who have red hair are most liable to it. Quarin thinks that men are more subject to it than women.

Spring and autumn are the seasons at which it is most frequent. In summer it hardly ever appears. Both Quarin and Van Swieten mention cases in which it appeared periodically, regularly attacking the patient in the spring or autumn. Such cases indeed are not very rare.

In its exciting causes also, the cynanche tonsillaris agrees with the other phlegmasiæ. Cold, particularly if attended with a high temperature or partially applied, is still the chief exciting cause. Sudden vicissitudes of temperature, Quarin * observes, cold air passing through chinks or open doors especially if it fall on the neck, riding against a cold wind, much singing or vociferation, the blowing of wind instruments, acrid aliments, medicines, or poisons, the suppression of accustomed evacuations, and a peculiar state of the atmosphere, are the exciting causes of inflammatory angina.

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* De Febribus.

With respect to the last of these causes, of which much has been said, if we except cold, damp, and variable weather, there does not appear to be any peculiar state of the atmosphere which tends to produce this complaint.

When cynanche arises from any one of the causes which have been mentioned, it is usually a very mild complaint. It is when more than one have been applied, when, for example, the patient has been exposed to cold during very moist and variable weather, and is of a sanguine and plethoric habit, that it assumes a more alarming form.

3. Of the treatment of Cynanche Tonsillaris.

There is a striking resemblance between the treatment of the inflammatory sore-throat and ophthalmia; the chief differences arising from the nature of the part affected, and from the former being more frequently a febrile disease.

I shall follow the same order here as in considering the treatment of ophthalmia;

in the first place taking a view of the means employed in the simplest cases, and afterwards pointing out in what way the practice must be rendered more complicated as the symptoms become so.

In many cases of cynanche tonsillaris we employ only local means. These may be divided into two classes, those applied to the internal, and those applied to the external fauces. In the mildest forms of the complaint the former only are necessary.

The remedies applied to the internal fauces consist chiefly of mixtures for washing the inflamed parts, the composition as well as the effects of which are analogous to those of collyria in inflammation of the eyes.

The gargles employed in inflammatory sore-throat may be divided into four classes, according to the different objects we have in view in employing them. 1. Those employed for the purpose of procuring resolution. 2. Those proper when suppuration is unavoidable. 3. Those proper when the abscess has burst sponstaneously or been laid open; and, 4. Those which are necessary when a tendency to gangrene has supervened.

The purposes for which these different gargles are employed point out what their composition ought to be. In the use of the first class our object is, by their stimulating, and what has been called cooling properties, to diminish the inflammation; by their mucilaginous property to defend the parts when the saliva is thin and acrid; and by their detergent quality to cleanse the parts when clogged with thick viscid mucus.

The first purpose may be answered by the vegetable and mineral acids, vinegar, the juice of acidulous fruits, the vitriolic and marine acids properly diluted, &c.; also by some of the neutral salts, particularly nitre and sal ammoniac, by alkohol in various forms, and many of the gums, particularly myrrh, the tincture of which, properly diluted, forms an excellent gargle. The same may be said of many other acrid substances, the volatile alkali, capsicum, horse-raddish, mustard, &c. Astringent substances, particularly alum, and Peruvian and oak bark, are employed with advantage.

When the gargle should be mucilaginous, we may add to it sugar, gum arabic, or the white of egg, or use a decoction of some of the mucilaginous herbs.

When the fauces are clogged with thick mucus, the application should be more stimulating; a mixture of honey and the marine acid is often employed with advantage; Sydenham recommends the sulphuric. These must be applied with a pencil. A principal part of their effects seems to depend on their increasing the flow of saliva, by which the mucus is diluted and washed off.

But if the disease has continued for a considerable time with little remission, especially if the pain abates while the swelling still continues or increases, we have little hopes of procuring resolution. Our view then is to induce a speedy and favourable suppuration, and for this purpose gargles of a different kind are proper.

They should consist entirely of warm emollient fluids, and be used in large quantity.

tity. "Sed hoc primo elapso tempore," namely, the time during which there is hope of resolution, "emollientia et demulcentia prœscribi solent, e lacte nimirum, radicibus althœæ, floribus malvæ, seminibus lini, caricis pinguibus, gummi arabico,"* &c.

In short, here, as in the former case, the composition of the gargle is readily determined by reflecting on the end we have in view. It is no longer our wish to diminish the inflammation, we therefore avoid those applications which tend to relieve it, the gargle ought therefore to be mild. We wish to promote suppuration, nothing for this purpose is so powerful as the application of warmth, the gargle should therefore be used warm, and in large quantity, that its temperature may not be suddenly reduced.

The best way of using this gargle is from time to time to permit as large a quantity as can conveniently be retained to lie on the part till it acquires the temperature of the mouth.

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* Lieutaud's Synopsis Prax. Med.

After the abscess has burst, our view is to dispose the parts to heal, then emollient and gently astringent gargles are the best.

If a tendency to gangrene should appear, we must immediately have recourse to antiseptic gargles, improperly so called indeed, because it does not appear to be any antiseptic power acting on the putrifying parts, but their peculiar stimulus acting on those which still retain their vitality, that is serviceable.*

The best of these gargles is composed of the bark and port wine. If the parts lie within reach, they should be scarified and touched with more stimulating applications. But the treatment in such cases we shall presently have occasion to consider more fully. It is the same with that of cynanche maligna with this difference, that, as gangrene in cynanche tonsillaris is the consequence of increased excitement, we must, especially on the first appearance of the gangrene, be cautious in the use of means which tend to increase the inflammation, lest we rather increase than diminish the tendency to gangrene.

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* See what was said on this subject in speaking of the treatment of the phlegmasiæ in general.

Such are the various applications to the internal fauces employed in cynanche tonsillaris. There has been some difference of opinion respecting the best way of applying them. Gargling is the best means of washing the internal fauces; but the motion of gargling sometimes increases the inflammation, so that many dissuade from it in the cynanche tonsillaris. In the milder cases the motion in gargling never does harm. In the more severe it is proper to avoid it. The medicine should then be thrown into the fauces by means of a syringe, or something should be given which may be swallowed.

In the worst cases however the deglutition is interrupted, and even washing the parts with a syringe is found to increase the inflammation. In such cases the medicine must be gently dropped on the parts affected, applied with a piece of lint or made thicker and applied with a pencil, or, as Sydenham recommends, merely kept in the mouth for sometime and then allowed to run out.

Where the deeper-seated parts are affected, swallowing is the only means we have for making any application to the inflamed part, and it unfortunately happens, we have seen, that in these cases swallowing is most difficult and painful, and most frequently interrupted. When the pain occasioned by swallowing is very great, it more than counterbalances any advantage to be expected from the medicine.

Some practitioners affirm that gargles and other washes for the throat should be used cold, while others maintain that they should always be of the same temperature with the body. The observation made when speaking of collyria is applicable here. When the inflammation is slight the gargle may be cold, it is then of little consequence indeed whether it be cold or tepid; when the inflammation is more severe it should be of the same temperature with the body. If we are endeavouring to promote suppuration, its temperature should be higher.

The applications to the internal fauces are sometimes made in the form of vapour. The vapour of warm water employed at an early period tends to procure resolution; at a later period to induce a speedy and favourable suppuration. When the former is our view, vinegar may be added to the water. The vapour may be drawn in through the spout of a tea-kettle, or more conveniently and effectually by the instrument termed an inhaler. We have reason to believe that little advantage is derived from impregnating the vapour with the flavour of the flores sambuci and other aromatics recommended by Eller, Lieutaud, and other foreign writers.

There is some difference of opinion respecting the employment of sialogogues in this complaint; the advantage often derived from spontaneous salivation has induced some to recommend them, but the irritation they occasion seems generally to counteract any benefit to be expected from the increased flow of saliva. Practitioners therefore seldom employ mere sialogogues in cynanche tonsillaris, but if the means which prove otherwise serviceable excite a flow of saliva, it tends to diminish the inflammation.

According to the mode of arrangement I follow, local blood-letting, when performed from any part of the internal fauces, should be considered here. It will be better however to throw into one place the few remarks to be made on this remedy.

Of the local remedies employed externally in the inflammatory sore throat.

These must be conjoined with the foregoing remedies. The simplest are warm applications and rubefacients. With respect to the composition of the rubefacients; mustard generally employed in other cases is too harsh an application here. Sir John Pringle advises a piece of flannel to be moistened with oil and a solution of the mild volatile alkali, in the proportion which the patient can easily bear, and applied to the throat. By this remedy, he remarks, a sweat is brought out on the neck and sometimes over the whole body. This composition, which has been very generally employed,

ployed, is much more effectual than bags of hot salt or sand recommended by some, and more agreeable than the dung of animals, which has actually been often employed for the same purpose.*

If the general excitement be considerable, it is proper to delay the use of rubefacients till it has been reduced by proper evacuations.

The same may be said of the employment of blisters, which are a more powerful remedy in this complaint. They are never proper however at an early period, for if the excitement is not considerable the complaint is mild, and then blisters are too severe a remedy.

When they are employed they should be pretty large and applied as near the fauces as can conveniently be done. A large blister between the shoulders is often serviceable. Although blisters do not at first bring relief, we are not to despair of their proving useful, for when the first fails a second often succeeds, or when the discharge excited at first brings no relief, the continued discharge kept up by the ung. cantharid. frequently succeeds better.

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* Dr. Sims on Epid. Dis.

But in this, as in similar cases, there is no local remedy so generally beneficial as local blood-letting. Scarifying the parts affected as far as they can be reached is often recommended. This is particularly serviceable when the swelling is very considerable, but when it is not, there are better means of local blood-letting in this complaint. The ranular veins are sometimes opened, but this, as Dr. Cullen observes, is an insignificant remedy, and as it is at the same time a troublesome one, it is seldom put in practice.

Scarification and cupping on the neck is more effectual. When the neck is much swelled and inflamed, Tissot observes, one or two cuts made pretty deep have often saved the patient's life; leeches however are still the most convenient means of performing local blood-letting.

When a tendency to suppuration has taken place, emollient poultices applied to the external fauces are proper.

Certain operations form part of the local means employed in the cynanche tonsillaris. These belong to the province of the surgeon. The most common is laying open the abscess after it is completely formed, which lessens the duration of the complaint. This, it is evident, can only be done where the seat of the abscess can be brought into view or distinctly felt.

Bronchotomy is a more serious operation, and fortunately less frequently necessary. When the swelling threatens suffocation, however, it ought never to be delayed. Many have laid it down as a rule never to perform this operation when, from a weak and intermitting pulse, and other symptoms of extreme debility, the patient's death appears inevitable. This advice seems to proceed from too anxious a regard for the practitioner's reputation, which might be injured by the patient's dying after the operation. When it is recollected that in such cases the most alarming symptoms are often the consequence of the impediment opposed to respiration, and will disappear when a free passage is given to the air, we shall see reason for making the attempt even where the state of the patient appears almost desperate. The reader will find Michaelis, in his Treatise de Angina Polyposa, and others who were conversant with bronchotomy, speaking of it as a very trivial operation, always to be had recourse to where there is any risk of suffocation.

Such are the various local means employed in the inflammatory sore-throat. In the mildest cases, the simplest of these, any of the common gargles, and external warmth, are sufficient.

But wherever the more powerful local means are necessary, we must at the same time have recourse to general means in order to diminish the excitement, for then fever always attends, and sometimes, we have seen, runs very high.

In such cases every part of the antiphlogistic regimen is necessary, and should be more or less strictly enjoined according to the degree of general excitement. Even where the excitement is not considerable, all kinds of animal food and fermented liquors must be avoided, and the diet should be light and diluent, a large quantity of even the mildest solid food often increasing the affection of the fauces.

However serviceable dilution may be, the patient should not be forced to drink when the pain of deglutition is considerable. In such cases, where the symptoms are generally considerable, frequent and copious clysters ought never to be omitted. In the one way or the other, dilution should, in all the severer forms of the disease, make a principal part of the treatment. "Interea larga manu propinantur serum lactis "aqua nitrosa aliaque diluentia et demul-"centia."*

When deglutition is wholly interrupted, the patient must also be nourished by clyster, till by the most active means the inflammation of the fauces is reduced.

The first evacuation affecting the whole system, generally employed in inflammatory sore-throat, is vomiting. Emetics given early, and they should never be omitted where there is any degree of fever, often cut short the complaint, and seldom fail to bring considerable relief. Where there is much fever the effects of emetics may be explained by their tendency to promote perspiration; but it is remarkable, that even where there is no affection of the system, they often, in a way we cannot explain, more effectually relieve the inflammation of the fauces than any local remedy we can employ.

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* Lieutaud's Synopsis Prax. Med.

At an advanced period of the disease their exhibition requires more caution, and is always less effectual. If the inflammation runs very high they may do harm. Tissot even asserts, that in such cases they may render the disease mortal. Where however the swelling is considerable, compared with the other symptoms, they are often serviceable even at a late period. Lieutaud says he has seen patients labouring under inflammatory angina snatched from the jaws of death by an emetic.

Emetics indeed are sometimes employed with advantage even after the formation of the abscess. When the abscess is situated in the deeper parts of the pharynx, or in the œsophagus, the surgeon cannot reach it, and then the exhibition of an emetic is the most effectual means to procure the discharge of the matter. If the abscess is ripe, the exertion of vomiting will almost always occasion its bursting. However improbable the success of this practice may appear, the reader will find it attested by most writers on the subject. Not only vomiting, but even coughing or laughing, will frequently occasion its bursting. Tissot says he has seen it occasioned in both of these ways.

Another circumstance which often renders the use of vomiting proper towards the end of the disease, is a collection of irritating matter accumulated in the stomach, in consequence of the patient's having swallowed large quantities of acrid or viscid saliva, which both load the stomach and vitiate its secretions. The matter discharged by the abscess also is frequently swallowed.

Next to vomiting, the general evacuation most frequently employed in cynanche tonsillaris, is catharsis. From the general efficacy of catharsis in inflammatory affections of the head, and from the cynanche tonsillaris sometimes terminating by a spontaneous diarrhœa, physicians were led to rely much on the use of cathartics.

Much catharsis however is seldom beneficial, and in the generality of cases the most judicious practitioners prescribe only a mild saline cathartic, and repeat it several times in the course of the complaint. When the inflammation and general excitement is very considerable, more evacuation by the intestines is proper, and then mercurial cathartics are the best, both because they can be swallowed with much more ease than the saline, and because, as will appear more particularly in treating of some of the other phlegmasiæ, mercury seems possessed of some specific power in cases of local inflammation.

In the worse cases however where either the pain of swallowing is so great that the patient refuses to take any thing by the mouth, or deglutition is absolutely interrupted, we must have recourse to the frequent exhibition of copious cathartic clysters, interposing such as are merely diluent.

General blood-letting is seldom necessary in this complaint. The affection of the fauces can be more effectually relieved by local blood-letting, unless the excitement be very considerable. When general blood-letting is judged necessary, the blood, as in other inflammations of the head, should be taken from the jugular vein, that the same operation may serve the purpose of both local and general blood-letting.

When delirium or coma supervene, general blood-letting is the remedy on which we chiefly rely, and it must be repeated till the symptoms yield. With the addition of local means to relieve the affection of the fauces, the complaint must then be treated in precisely the same way as phrenitis.

Diaphoretics are more serviceable in inflammatory sore-throat than in most of the complaints we have been considering. It is often terminated, we have seen, by spontaneous sweating. A sweat forced out by external warmth and heating medicines however is rarely serviceable, and often does harm. Diluting liquors, the ammonia acetata or any other mild diaphoretic, together with avoiding exposure to cold, and as soon as any degree of moiſture appears on the skin abstaining from the use of cathartics, are often sufficient to induce a sweat which is generally beneficial.

Although in the phlegmasiæ opium given alone, before the excitement is greatly reduced, generally does harm, combined with ipecacuanha, we shall find, it may with great advantage be given at a much earlier period in many of this order of diseases; we have reason to believe in all of them. But of the effects of this medicine I shall have occasion to speak more particularly hereafter.

The degree of fever which generally attends the severer cases of the cynanche tonsillaris renders the vapour bath applied to the head less proper than in ophthalmia, ear-ach, and tooth-ach.

When the inflammation runs to gangrene we must have recourse to the bark and wine, with caution however, lest by exhibiting them too early we rather increase than diminish the tendency to mortification. The observations made on the treatment of gangrene supervening on ophthalmia are applicable here.

There is a material difference, we shall find, in the treatment as well as prognosis of gangrene supervening on the cynanche tonsillaris, and the cynanche maligna. In the latter, we shall find, it arises directly from debility; the most invigorating plan is proper, and often successful. In the former, it is the consequence of excessive general excitement; till this is sufficiently diminished, the invigorating plan will do harm, and when the excitement is sufficiently diminished, it is often too late for any plan to be of much service. When deglutition is interrupted, the bark and wine must be exhibited per anum. Such are the various means employed in the inflammatory sore-throat. It is to be remembered that the practice should be the more vigorous, the more the inflammation extends towards the œsophagus, and most so when the inflammation has its seat there. "Funestissima "est angina, quæ nec in faucibus nec in "cervice quidquam conspicuum exhibet."*

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* Quarin De Febribus.

As metastasis sometimes happens in the cynanche tonsillaris, in which the inflammation attacks some of the viscera, most frequently the lungs, we must be prepared for this accident, and watch the slightest tendency to it.

It will be proper before leaving this subject to make a few additional observations on the means to be employed after a total interruption of deglutition, the most perplexing, and one of the most alarming accidents in this complaint. The interruption of deglutition may proceed either from swelling of the œsophagus, from schirrus, from swelling of the glands particularly in scrophulous habits, or from spasm.

In the first case the most powerful antiphlogistic, particularly local, remedies can alone be of service. In the last, which frequently occurs unaccompanied with cynanche, but is most apt to supervene while this complaint is present, a great variety of remedies have been recommended; few of which however have been found of much service.

The medicines which seem to have proved

most beneficial are emollient and oily applications used externally, and internally if any power of deglutition still remains, and the medicines which have been termed antispasmodics, particularly opium. Van Swieten* recommends a soap composed of oil of turpentine, vegetable alkali, sal ammoniac, and spiritus mindereri, to be applied externally, and also used internally if it can be swallowed. But even where oily and emollient medicines procure some relief, it is seldom permanent.†

Dr. Johnstone thinks that opium and the extract of cicuta promise more in this case than other medicines. When any power of deglutition remained, he desired the medicine to be swallowed; in other cases the opium and cicuta were made into pills, which the patient was desired to hold in the mouth till they were dissolved and taken up by the lymphatics. The exhibition of mercury has been pushed to salivation without bringing relief.* Mechanical force has been employed. This however is always attended with danger, and has even proved fatal, as in a case mentioned by Dr. Johnstone.

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* Com. in Aph. Boer. Aph. 797.

† See a paper by Dr. Johnstone, in the second vol. of the Memoirs of the Med. Soc. of London.

When there is reason to believe that deglutition is prevented by a schirrus of the œsophagus, he thinks bougies of a proper size may be employed with safety and often without giving much pain.

When the dysphagia arises from a swelling of the lymphatic glands, the medicines employed in scrophula are often serviceable. In this case the author just mentioned says he has succeeded by means of burned sponge and the flores martiales, which he directs to be held in the mouth if the power of deglutition is wholly lost. Others recommend this mode of exhibition in similar affections of the throat, even where there is no difficulty of swallowing; and when the complaint is in the lymphatic glands there is reason to believe that it is the most effectual.

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* Dr. Johnstone succeeded in one case by means of corrosive sublimate and the bark, but thinks they do not promise to be generally successful.

When the patient has been weakened by previous disease, or the inflammatory sore-throat itself has been severe, it is necessary for some time after it, to use means for restoring the strength. Nourishing food and wine are generally sufficient for this purpose. Dr. M'Bride and others recommend the bark and steel, which, if any medicines are necessary, are the best.

Those who are subject to frequent attacks of cynanche tonsillaris, can only avoid it by avoiding its remote causes, particularly the various causes of plethora and exposure to cold.

As after frequent attacks of the disease the fauces are left in a state of relaxation which is favourable to its return, the use of astringent gargles for sometime after the complaint, is often necessary. Those prepared from the bark and alum appear to be the best. Keeping a piece of alum in the mouth and swallowing the saliva impregnated with it, often proves a good preventive.

SECT. II.

Of the Cynanche Maligna.

THIS form of cynanche, we have seen, from the definition quoted from Dr. Cullen's synopsis, affects the tonsils and mucous membrane of the fauces with tumor, redness, and mucous crusts of a whitish or ash colour gradually spreading and covering ulcers. The fever which attends it, contrary to what happens in the other phlegmasiæ, partakes more of the typhus than synocha, and it is very frequently attended with an eruption on the skin of the same nature with that of the scarlatina, between which and the cynanche maligna there is so striking an analogy, that when the former is attended with sore-throat and the latter with the eruption, as happens in most cases, they can only be regarded as varieties of the same disease.

However important it may at first view appear to detect a diagnosis between complaints, in many cases of which the treatment is directly opposite, on a closer view it will be found that such a diagnosis, did it exist, would, in the present instance, be altogether useless in practice; for if the symptoms of the two complaints run imperceptibly into each other, the same is true of their modes of treatment; and there is no difficulty in adapting the means we employ to any case, according to the degree in which the one or other set of symptoms prevail.

Without a diagnosis indeed we cannot so readily give a name to every case of the disease; we are constantly meeting with cases where the symptoms of scarlatina and cynanche maligna are so blended that it is difficult to say of which disease they partake most. But this is the amount of the embarrassment; we practice in such cases with as much ease as in either complaint exquisitely formed; so that those who have with so much eagerness been searching after a diagnosis between these complaints, have been searching after little more than a name.

Were we attempting to form a perfect system of nosology, which, in the present state of knowledge, perhaps in any state of it, is impossible, the object would be one of importance, but while our aim is merely to form such a system as shall assist us in practice, it is of none.

It is a dispute of as little consequence whether the cynanche maligna and scarlatina should be regarded as different diseases, or only different degrees of the same disease. If by different diseases we mean those whose symptoms differ, they are surely very different; if by different diseases we mean those whose causes are different and which never run into each other, they must be regarded as varieties of the same disease.

Some have regarded the scarlatina and cynanche maligna as three, not two, different complaints, namely, that in which the skin, and not the throat, is affected; that in which the throat, and not the skin, is affected; and that in which both are affected. Respecting this division, it is only necessary to observe, that it is neither useful in practice nor accurate in a nosological point of view. If we aim at nosological accuracy, the last of the three complaints can have no place; for if the two former be admitted, this can be regarded in no other light but as a combination of them.

This is perhaps the most accurate view of the subject, according to which the scarlatina simplex alone should have been ranked among the exanthemata; and the pure cynanche maligna, namely, that unattended by an affection of the skin, considered a distinct complaint. It would then have been easy to describe the appearances resulting from the combination of the two diseases, and the manner in which the treatment should be adapted to different cases, according as the symptoms of the one and the other prevail.

As the scarlatina and cynanche maligna strictly so called often appear unattended by each other, in a system of nosology they should be regarded as distinct diseases; as they are so frequently combined, their combinations must be treated of in a system of practice. Such appears to be the most accurate view of these diseases. I have not chosen however to depart so far from the manner in which they are considered by others.

1. Of the Symptoms of the Cynanche Maligna.

The symptoms of this complaint are so complicated, that it is difficult to give a view of them at the same time sufficiently full and distinct.

We shall in the first place consider the manner in which the disease makes its attack. 2. The symptoms arising from the affection of the fauces. 3. The other symptoms which attend this affection. 4. The various appearances of the eruption. It will then be proper to make a few observations on the different terminations of the disease; and lastly, we shall compare the symptoms of the cynanche maligna and scarlatine cynanchica in the same manner as those of the latter were compared with the symptoms of the scarlatina simplex.

The attack of cynanche maligna often differs but little from that of simple fever. The patient complains of lassitude, dejection of spirits, pain, and giddiness of the head. He is generally affected with more or less cold shivering, frequently alternating with fits of heat. He soon becomes thirsty and restless, the pulse is frequent, and the breathing more or less hurried.

These symptoms seldom continue long before the patient complains of a sense of stiffness about the neck, with some pain and difficulty of swallowing, and on inspecting the fauces, they appear red and swelled. In many cases the affection of the fauces is troublesome from the beginning, and is sometimes the first symptom.

When the disease makes its attack in this way, the prognosis is favourable, it is probable that the affection of the fauces will not be alarming, and that the complaint will partake considerably of the nature of the scarlatina.

But when along with the foregoing symptoms the patient complains of severe headach, especially a pain in the crown of the head, violent pains of the back and limbs, or pain in the stomach, with nausea and vomiting or with diarrhœa; * when instead of

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* The diarrhœa is often bilious. Both the vomiting and diarrhœa are most frequent in children. Although nausea and vomiting are among the worst symptoms

of slight giddiness of the head, he is affected with coma or delirium; when the eyes are heavy and watry, the countenance either full and bloated, or pale, shrunk, and dejected; when the patient complains of an unusual sense of oppression and debility; when the pulse is small, irregular, or tremulous, whether frequent or not, (Quarin * observes, that the pulse is sometimes less frequent than natural at the commencement of cynanche maligna) or full, heavy, undose, and unequal, as Huxham † expresses it; when the breathing is small, hurried, anxious, and interrupted with sighing; when the urine is quite limpid, or very high coloured and turbid; when the sensation in the fauces is rather that of an uneasy stiffness than of pain, the deglutition being little impeded; ‡ when the internal

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of this complaint, yet it often proves fatal when they have not appeared. Mr. Colden says they rarely occurred in the epidemic he saw. See Mr. Colden's letter to Dr. Fothergill, in the first volume of the Medical Obs. and Inq.

* De Febribus.

† On the Malignant Ulcerous Sore-throat.

‡ The pain and difficulty of swallowing, Dr. Wall observes,

ternal fauces appear of a dark red with brown spots, the tongue, especially towards the root, being loaded with much viscid white mucus; when an eruption of small red pustules or purplish blotches appear on the skin soon after the commencement, or at the very commencement, for in the worst cases of cynanche maligna the eruption has been known to be among the first symptoms, the prognosis is bad.

It is not meant that all the foregoing symptoms shew themselves at the commencement even of the worst cases. It is sufficient, if several of these appear, to denote the malignity of the disease.

The very worst cases of cynanche maligna however sometimes make their attack in so deceitful a way, that for some time, the symptoms differ little or not at all from those of the most favourable cases, so that although the one set of symptoms always affords an unfavourable, the other does not

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observes, is sometimes so trifling, that the complaint often makes great progress without the patient knowing that there is any disorder in the throat. He relates a case in which this happened.

uniformly afford a favourable prognosis. In some cases the symptoms remain very mild for several days. Mr. Colden[*] says, children often drooped, and if they had sores or issues, the matter began to look ill several days before they were considered as labouring under the complaint. Huxham makes nearly the same observation.

The strength in particular is often not much impaired at an early period, nor always indeed in the progress of the complaint. Even in the worst cases, Mr. Colden observes, many walked about till within an hour or two of their death.

It has sometimes happened, as in an epidemic described by Mr. Stephen,[†] that the temperature of the body was hardly greater than natural, not only at the commencement, but throughout the whole complaint.

The absence of all the symptoms of fever indeed at an early period, by no means assures us that the case is free from danger. Mr. Collins[‡] observes, that in the malignant sore-throat epidemic in St. Vincent, the fever did not usually appear till the affection of the throat had lasted seven or eight days, and the patient generally walked about, notwithstanding a very bad state of the throat, till the fever came on.

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[*] Med. Obs. and Inq. vol. i.

[*] Med. Comment. vol. xii.

[†] Med. Comment. vol. ii.

It is even asserted by some that the cynanche maligna has appeared without being accompanied by fever at any period. Mr. Short, in his Chronological History of the Weather, observes, that this was the case in the malignant sore-throat which raged in England in 1742.

On the state of the throat depends the prognosis at every period of the disease. At first, we have seen, the patient complains of a stiffness of the muscles of the neck, and some difficulty in deglutition.* As the affection of the fauces increases, it is often attended with some degree of hoarseness, which, like the difficulty of deglutition, however is seldom considerable.

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* As in the cynanche tonsillaris, the œsophagus is sometimes but rarely affected with spasm, rendering the deglutition very difficult or wholly interrupting it.

If the breathing be much affected, it proceeds from the inflammation spreading to the trachea, which sometimes happens, giving rise to a combination of this species of cynanche, and the next we are to consider, the cynanche trachealis. The latter however does not, we shall find, when arising from the cynanche maligna, assume precisely the same appearance as when an idiopathic complaint. Some of the symptoms denoting an affection of the trachea in cynanche maligna do not appear in cynanche trachealis.

However florid and free from specks the fauces may appear at the commencement of the cynanche maligna, they soon assume a dark red, and specks of some shade between a light ash colour and a dark brown appear scattered over the tonsils, velum pendulum palati, and uvula. The lighter the colour of the specks, the better is the prognosis.

The first appearance which the internal fauces assume in this complaint, is sometimes that of a large whitish coloured stain surrounded with a florid margin, the stain soon becoming a large slough.

The swelling is sometimes considerable, but seldom so much so as in the cynanche tonsillaris. In the appearance of the throat indeed, as well as the other symptoms, the cynanche maligna frequently at an early period so nearly resembles the inflammatory sore-throat, that they can only be distinguished by the nature of the causes from which they arise, and that of the prevailing epidemic.*

As the sloughs spread, they generally become of a darker colour, the interstices at the same time assuming a purple hue, new specks appear, and the whole internal fauces are at length covered with thick sloughs, which frequently fall off, discovering ulcers sometimes very deeply seated.

When the sores left after the separation of the sloughs, appear of a fiery red, the danger, Mr. Colden observes, is very great. When they become covered with a black crust, the event is generally fatal. When, on the other hand, as Huxham remarks, the parts which the sloughs covered appear florid and clean, the prognosis is favourable.

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* See the diagnosis between these complaints, in the 211th page of Dr. Fothergill's works published by Dr. Lettsom.

As the disease advances, the breath becomes very fetid and is often disagreeable to the patient himself. He generally spits out much mucus tinged with blood, and often a matter of a livid sanious appearance, which is sometimes so corrosive that it excoriates every part it touches. The lips are often of a livid or black colour, and on their inner sides, covered with small vesicles containing an acrid ichorous matter. The sudden suppression of the discharge from the throat has been observed, especially in children, to be followed by a very dreadful train of symptoms, which often suddenly prove fatal.

In the worst cases, the fauces at length appear quite black, mortification having taken place, and pieces of mortified flesh fall off from them, and are spit out. It is needless to say that this symptom affords a very unfavourable prognosis; it is not always fatal however, some recover even from this state of the fauces, as I have myself witnessed.

When the complaint takes a favourable turn, the parts surrounding these sloughs begin to assume a more florid appearance, and a better conditioned matter begins to be discharged from the ulcers.

While the affection of the fauces increases the various symptoms of general derangement keep pace with it. If neither delirium nor coma appeared at an early period, when the affection of the throat is considerable, they generally come on in the progress of the complaint. The eyes become more fixed, dull, and heavy; the delirium being for the most part of that kind which attends typhus. Dr. Fothergill has observed, that the delirium in cynanche maligna is of a peculiar kind; an observation which has not been confirmed by the experience of others.

In some cases the delirium is of the phrenitic kind. There is then reason to believe that the inflammation has spread to the brain; an accident which generally proves fatal. The countenance is then flushed and assumes an expression of fierceness,

ness. In the generality of cases it is swelled and bloated, sometimes so much swelled, Mr. Russell * observes, as to close the eyes, or shrunk and cadaverous.

Early in the disease there is a strong expression of anxiety in the countenance, which wears off as the debility increases. At a more advanced period the eyes are generally affected with a languid inflammation, in the worst cases often suffused with blood, which is a very fatal symptom.

All kinds of hemorrhagies are unfavourable in the exquisitely formed cynanche maligna. The observations made on this symptom in simple typhus are applicable here.

Petechiæ do not so frequently attend cynanche maligna, as the other symptoms would lead us to expect. In some epidemics they are more frequent than in others: Dr. Wall and a few other writers speak of them as not an unusual symptom. In an epidemic mentioned by Mr. Short, they seem to have appeared in almost every case.

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* Œconomy of Nature in Acute and Chronic Diseases.

As the disease advances, the pulse becomes more depressed. On touching the skin, which is generally parched, the same sensation of heat is experienced as in malignant typhus.

Throughout the greater part of the complaint, there is generally an exacerbation in the evening, during which the breathing often becomes rattling or even sterterous.

The diarrhœa increases in the progress of the complaint, or supervenes if it did not appear at the commencement, the patient complains of griping pains, and the matter discharged is often so acrid that it excoriates the anus and neighbouring parts. When the fæces become black, the prognosis is very bad.

The supervening or increase of the diarrhœa in the progress of the complaint seems often, Dr. Huxham observes, to proceed from the acrid matter of the fauces getting into the stomach and intestines, or from the sloughy affection of the fauces spreading to these parts, for in some cases it has been traced along the whole course of the alimentary canal,* and the hemorrhagies which succeed the abrasion of the sloughs in the intestines are often very considerable.

It was observed above, that the inflammation in some cases spreads to the larynx and trachea. The same is true of the ulcers; they have been traced by dissection even beyond the division of the trachea. As soon as the complaint attacks the windpipe, a very troublesome set of symptoms supervenes; the voice is altered, assuming a wheezing or ringing sound, sometimes it is lost, the breathing becomes difficult, and is now and then wholly interrupted so that the patient is suffocated. He is teased with a severe cough endeavouring to bring up the acrid matter secreted by the ulcers, which resembles that spit out from the fauces; it is sometimes mixed with small tubiform substances, once supposed to be portions of the internal membrane of the trachea and bronchiæ, but now known from dissection to be a matter formed by the disease, which lines these canals, and which we shall have occasion to consider more particularly in treating of the cynanche trachealis.

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* See Mr. Russell on the Œconomy of Nature in Acute and Chronic Diseases, Huxham on the Ulcerous Sore-Throat, &c.

The tendency of the cynanche maligna to affect the trachea, has induced Dr. Johnstone to propose dividing he complaint into the cynanche maligna tonsillaris, and trachealis.

In the more severe cases indeed almost every part in the neighbourhood partakes more or less of the affection of the fauces; the membrane lining the nostrils is generally much affected, an acrid matter often mixed with blood running from it, which excoriates the lips or any other part it falls upon; it sometimes even raises blisters on the hands or arms of children, when they employ them for wiping it away from the lips. The irritation of this matter in the nostrils often occasions frequent sneezing.

Unfavourable as such a discharge always is, its sudden interruption is still more to be dreaded. Huxham says, that the ceasing of this discharge "choked several." This symptom is seldom so considerable in adults as in children.

The inflammation, as in the cynanche tonsillaris, sometimes spreads along the eustachian tube to the internal ear, occasioning ulceration, and sometimes wholly destroying its structure. Mr. Colden makes the following curious observation, that some had sores, like those on the throat, behind the ears, on the genitals, or other parts of the body, and in these cases there was sometimes no ulceration or even affection of the throat.

The inflammation often spreads to the parotid, maxillary, and other glands in the neighbourhood of the fauces, which become swelled and painful. Huxham says, that he has seen this happen at the very commencement of the disease, and even threaten suffocation.

The whole neck indeed sometimes becomes swelled and of a dark red colour. Even the arms, hands, and fingers, in some cases, become inflamed, swelled, stiff, and painful.

When the trachea is much affected, particularly if the disease spread beyond its division

vision into the bronchiæ, an inflammation of the lungs often comes on and proves fatal. Pneumonia indeed sometimes supervenes in the cynanche maligna, without being preceded by any affection of the trachea, and has even suddenly destroyed the patient where there had been no alarming symptom, as happened in some cases under the care of Mr. Colden.[*] "Sometimes," he observes, "they died very suddenly when "their situation had not appeared alarming, "and on dissection the lungs were generally "found inflamed." Mr. Collins[†] also observes, that the cynanche maligna sometimes proved fatal after the affection of the fauces had wholly disappeared, the inflammation having spread to the stomach or lungs. Hiccup, which, particularly at the height of the disease, has been observed to be a very unfavourable symptom, probably arises from the inflammation spreading to the œsophagus and stomach.

The cynanche maligna generally arrives at its height about the fifth or sixth day, and in cases which terminate favourably declines in five or six days. It has been observed, that it runs its course, that is, comes to its height and declines, more slowly in adults than in children.

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[*] Med. Obs. and Inq. vol. i.

[†] Med. Comment. vol. ii.

Such are the symptoms attendant on the worst state of the fauces in the cynanche maligna. When the disease takes a favourable turn, when the florid colour begins to return to the fauces and a better matter to be discharged from the ulcers, all the symptoms which have just been enumerated are either absent or considerably modified. The countenance begins to lose that peculiar expression, so characteristic of the worst forms of the disease. The pulse becomes stronger and less frequent. The respiration freer. The skin from being parched becomes soft and often moist, which is one of the most favourable symptoms of the complaint.

The evening exacerbations are less remarkable. The discharge from the intestines and that from the nares, if they still continue, are less acrid. In short, the various symptoms indicating danger disappear, or assume a milder form.

But whether the disease proves favourable or otherwise, a set of symptoms which still remain to be considered, generally attends.

The connection between the cynanche maligna and scarlatina, I have already had occasion to notice. It sometimes happens, we have seen, that the former, such as it has just been described, appears without any affection of the skin, in the same manner as we sometimes meet with the scarlatina without any affection of the throat; in general however the affections of the throat and skin are combined, and seem wonderfully influenced by the state of each other. But while the absence of the sore-throat in the scarlatina always affords a favourable prognosis, that of the eruption in the cynanche maligna generally affords an unfavourable one.

In some epidemics, the generality of cases have appeared without any affection of the skin. Lieutaud even speaks of the eruption as a rare occurrence in cynanche maligna. "Ut sileamus de efflorescentiis cutaneis aliis-"que variis symptomatibus."* Dr. Wall also observes of an epidemic cynanche maligna, that very few had the scarlet eruption. There are instances of epidemics indeed, as that described by Dr. Collins, in which the eruption did not appear in a single instance.

The period at which the eruption shews itself is various; it is rarely later than the fourth day, and seldom so early as the first. The early appearance of the eruption is unfavourable. It generally first shews itself about the neck and breast, sometimes with such itching that the patient tears the skin. In general, however, there is little or no itching.†

The eruption, often attended with some swelling, gradually spreads over the trunk and extremities. As in the scarlatina, it comes out in stains which, when nearly inspected, appear composed of small prominent pustules. Their prominence may sometimes be distinguished by the eye, more frequently by the touch only.

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* Synopsis Prax. Med.

† In some cases, Huxham observes, there is itching and desquamation without any eruption.

There are sometimes pustules of a larger size, particularly on the extremities, which are readily seen, being of a more intense red than the parts which surround them.

The appearances of the eruption affording a favourable prognosis, are the same as in the scarlatina, a florid colour, uniform diffusion over every part of the body, and a copious desquamation.

The eruption, however, is sometimes considerable where the prognosis is bad. Huxham says, he has seen some in this complaint die of a phrensy who were covered with " the most fiery rash " he ever saw.

It is rarely, however, that the eruption is uniformly diffused in the cynanche maligna; it generally comes out in blotches or small points scattered over the trunk and extremities, which are seldom of a florid red, but of a dark purplish or livid hue, and which terminate in but a very scanty desquamation.

When the eruption is favourable, a remission often takes place on its appearance, and almost always at the period of desquamation. When it is unfavourable, its appearance never, and its termination rarely, brings relief.

The duration of the eruption, like that of the complaint previous to its appearance, is seldom less than one day, and seldom more than four. In some cases it disappears and returns again, which is far from being favourable.

As in other eruptive fevers, the eruption in cynanche maligna has sometimes suddenly receded, an alarming train of symptoms supervening.* The patient falls into dropsical swellings, the countenance assumes a cadaverous appearance, and convulsions supervene, which frequently terminate in death. A similar train of symptoms has supervened on the eruption suddenly assuming a livid appearance, or becoming pale from being very high coloured.

We have reason to believe that here, as

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* See Mr. Russel's work on the Œconomy of Nature in Acute and Chronic Diseases of the Glands, and others on the Cynanche Maligna.

in other similar cases, a debilitated state of the system is the common cause of the changes which take place in the eruption, and the symptoms which attend these changes.

The desquamation often continues a long time after every other symptom is gone. It is not uncommon to see patients peeling the cuticle from their fingers, after they have been well for a fortnight or three weeks.

In the cases which terminate favourably, the symptoms often gradually abate without the appearance of any which can be regarded as critical; in most favourable cases, however, a gentle sweat appears about the time of desquamation. This crisis has been observed to be less perfect in adults than in children.

The sweat sometimes appears earlier than this period; it then brings relief, but seldom wholly removes the fever. "General "sweats," Huxham remarks, "on the "third, fourth, or fifth day, or later, were "salutary." Dr. Fothergill observes, that the morning sweats, when they occurred early in the disease, often brought such temporary relief to the febrile symptoms, that the complaint assumed the intermitting form.

A moisture sometimes appears on the skin in the mornings, however, without bringing any relief, which seems merely the consequence of debility, and indicates danger. The cynanche maligna, like most other febrile diseases, often abates with a copious sediment in the urine.

The other symptoms frequently critical in continued fever,* seldom prove so in cynanche maligna. As in all other febrile diseases, certain accidental symptoms are occasionally attended with relief. Thus, Mr. Russel says, a swelling of the tonsils was sometime critical.

With regard to the unfavourable terminations of this complaint, some I have already had occasion to mention; the patient, we have seen, is sometimes destroyed by the inflammation spreading to the stomach or lungs, or attacking the brain, so that he dies with the symptoms of gastritis, pneumonia, or phrenitis. As we might, a priori, suppose, visceral inflammation supervening on so debilitated a state of the body generally proves fatal.

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* See the observations on the crises of fevers, in the first vol. of this work.

A retrocession of the eruption, and ceasing of the discharge from the fauces, have also been mentioned as sometimes attending the fatal termination. The discharge from the fauces is most apt to be diminished during sleep.

Some die of profuse hemorrhagy from the intestines, nose, mouth, or ears. The menstrual discharge frequently appears before the usual period in the cynanche maligna, and sometimes becomes profuse. Many in this complaint have had it for the first time. If copious, or before the proper period, it is generally an unfavourable symptom; if very profuse, it may prove fatal.

Some die suddenly by suffocation, sometimes in consequence of the swelling of the glands of the neck, more frequently, of the complaint having spread to the trachea.

Others are gradually reduced by a catharsis of acrid matter, which, notwithstanding every means we can employ, often continues for some weeks.

When the trachea and its branches have been much affected, ulcerations are sometimes formed in the lungs, and hectic fever soon makes its appearance. I shall not here enter into the question whether the cynanche maligna gives rise to phthisis, except where tubercles have previously existed in the lungs; it is certain that it has occasioned phthisis where there had not previously been any symptom shewing a tendency to this complaint.

In many cases the fatal, like the favourable termination is unattended by any peculiar symptoms. The worst of the symptoms which have been enumerated gradually supervene. The fauces become black; if the eruption be present, it assumes a dark purple colour; even where there is no eruption on other parts, the swelling and purple colour of the throat often supervene, the breathing becomes difficult and sonorous, and is frequently interrupted for some seconds. A degree of stupor comes on, the eyes appear glossy, the fæces become very fœtid, and are passed involuntarily. In these circumstances, hiccup, one of the most fatal symptoms if it appear while the others are alarming, frequently comes on; the extremities become cold, and are covered with a clammy sweat. The pulse intermits, at length it cannot be felt, and the patient gradually expires, or is carried off by convulsions.

After the foregoing train of symptoms has supervened, nobody recovers; but let the state of the fauces and other symptoms be what it may, if the pulse be pretty steady and the strength not greatly exhausted, we are not to despair. The prognosis is very bad, but by the vigorous use of proper means the patient may be saved.

The prognosis in all cases of cynanche maligna will be best determined by observing how far the symptoms incline to those of scarlatina. In treating of the scarlatina the symptoms of this disease in its mildest form were compared with those indicating a tendency to cynanche maligna;

we are now to compare the symptoms of the exquisitely formed cynanche maligna with those indicating a tendency to scarlatina.

In the scarlatina the first symptoms are those common to most fevers, particularly the varieties of synocha. The face is flushed, the pulse full and frequent, and the patient complains of languor with chills and cold shivering.

If these be the only symptoms at the commencement of the cynanche maligna, they are generally more severe than in the scarlatina. In most cases of cynanche maligna however the patient complains of acute pains in the back and limbs, he is attacked with nausea and vomiting, or diarrhœa, or with both. In the worst cases the pulse from the first is often weak and tremulous; the loss of strength for the most part is great and sudden; the extreme anxiety which generally attends this complaint is strongly marked in the countenance; and even delirium or coma supervenes on the first night.

In the scarlatina the eyes are inflamed and prominent. In the cynanche maligna they are often more or less inflamed also, but heavy, watry, and in the progress of the complaint, fixed and glossy.

When the eruption is florid and uniformly diffused, there is generally from the beginning considerable pain of the throat increased on swallowing, the fauces appear of a florid colour and considerably swelled, and if spotted, the spots are of a light colour. In the true cynanche maligna the patient complains of little pain, but rather of an uneasy stiffness about the neck; the fauces appear of a dark red or purple, and are covered with crusts of an ash or darker colour. In this respect however there is much variety. In some cases of cynanche maligna the fauces at the commencement appear of a florid red, and now and then redder in some places than in others.

In the progress of the scarlatina the specks which appear on the fauces are not readily changed into ulcers, and never spread so as to cover the whole or greater part of the fauces, nor erode the subjacent parts; those parts which are not covered with the specks remain of a florid colour, and if there is an unusual excretion from the fauces it is only that of thin or viscid mucus or saliva. The contrary of all this is true of the cynanche maligna, the specks soon degenerate into ulcers, which spread rapidly to the adjacent parts, eroding those which lie beneath them. The whole fauces often assume a black colour, mucus mixed with blood, a livid sanies or even pieces of mortified flesh are spit out, and the fœtor of the breath is intolerable.

In the scarlatina there is no acrid discharge from the nostrils or intestines; in the cynanche maligna the discharge from both is often so acrid as to excoriate every part it touches.

The various hemorrhagies producing bloody saliva, bloody urine and stools, and a bloody suffusion of the eyes, are symptoms of the cynanche maligna never met with in scarlatina.

In the progress of scarlatina the face is generally red and somewhat swelled; in the cynanche maligna it is pale, swelled, and bloated, or shrunk and cadaverous.

In the scarlatina the mental functions are rarely deranged. In the cynanche maligna, if delirium or coma do not appear at the commencement, they seldom fail to supervene in the progress.

Various symptoms above enumerated, which never appear in scarlatina, often attend the cynanche maligna from the affection of the fauces spreading along the œsophagus to the stomach, or even along the whole tract of the intestines, and from its spreading to the trachea and larger branches of the bronchiæ.*

All the parts in the neighbourhood of the fauces, the eustachian tube, the internal ear, the parotid, maxillary, and other glands of the neck, more frequently partake of the affection of the throat in the cynanche maligna than in the scarlatina. In the cynanche maligna, the period at which the eruption shews itself is uncertain; we have seen that it sometimes comes out even on the first day; in the scarlatina it generally makes its appearance on the third or fourth day.

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* All those parts to which we have seen that the affection of the fauces in cynanche maligna spreads, are often found on dissection in the same gangrenous state with the throat.

In the latter it is of a florid colour, and soon spreads uniformly over the whole or a great part of the body. In the former it often appears in blotches or points, either not very discernible, or of a purplish hue.

In the scarlatina the appearance of the eruption often brings relief, particularly to the sickness and anxiety if they be considerable; it terminates in a copious desquamation of the cuticle, and if its appearance failed to bring relief, its termination seldom does. In the cynanche maligna it terminates in but a very partial desquamation, which, like the appearance of the eruption, rarely brings relief.

In the scarlatina the eruption for the most part is steady, gradually assuming a brownish hue, which precedes the desquamation. In the cynanche maligna it is often inconstant, disappearing and again coming out several times in the course of the complaint.

It is in the cynanche maligna that a retrocession of the eruption, and the symptoms which accompany it, are most apt to occur.

Phrensy or pleurisy never supervene in the scarlatina, nor is it liable to be followed by phthisis.

A gentle sweat, which only sometimes appears at the time of desquamation in the cynanche maligna, and seldom proves critical, very generally accompanies the same period in scarlatina, and is almost constantly attended with an abatement of the symptoms.

It may not be useless to subjoin to what has been said, a short parallel of the symptoms of the scarlatina and cynanche maligna, given by Dr. Withering. Some parts of Dr. Withering's observations are less applicable to these complaints as they generally appear, than to the particular epidemics which fell under his observation, as the reader will perceive on comparing them with what has been said.

" In the scarlatina," he observes,* " the " skin is full scarlet, smooth; if pimply, " the pimples are white at the top, always " dry and hot. In the cynanche maligna " the skin is red tinged, pimply, the pim- " ples redder than the interstices, bedewed " with sweat towards the morning.

" In the scarlatina the blood is buffy and " firm; in the cynanche maligna, florid and " tender.

" In the scarlatina the eyes are shining, " equable, intensely red, rarely watry; in " the cynanche maligna they are inflamed " and watry, or sunk and dead.

" In the scarlatina in summer the tonsils " and parts in their neighbourhood are little " tumified and without sloughs; in autumn " they are more swelled and the sloughs " white. In the cynanche maligna the ton- " sils and parts in their neighbourhood are " considerably swelled and ulcerated, and " the sloughs are ash-coloured or dark- " brown or black.

" In the scarlatina the breath is very hot

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* In Dr. Withering's Treatise this parallel is expressed in a table.

" but not fœtid; in the cynanche maligna " it is offensive both to the patient himself " and his attendants.

" In the scarlatina in summer the voice " is natural, in cynanche maligna flat and " rattling.*

" In the former there is no purging at " the accession, in the latter there is.

" The scarlatina terminates on the third, " fifth, eighth, or eleventh day; the cy- " nanche maligna at no stated period.

" Lastly, the nature of the scarlatina is " inflammatory, that of the cynanche ma- " ligna is putrid."

With regard to the diagnosis of cynanche maligna, it is needless to make any addition to what has already been said.

Such are the symptoms of the cynanche maligna, and the means of collecting the prognosis in this complaint. Death may happen at any period; it has often happened even on the first day. Dr. Fothergill observes, that in the greater number of cases which terminated fatally under his care, the patient died before the fourth day. Those, he observes, who survived the fourteenth, were thought to be out of danger, at least from the disease itself, though some dropped off unexpectedly after a much longer reprieve; for the patient sometimes recovers from the disease, and falls a sacrifice to its consequences, dropsy or other diseases of debility.

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* The affection of the voice in cynanche maligna is most remarkable when the trachea is affected. See what was said on this part of the subject.

When the voice is much impaired, it sometimes does not recover its tone for many months or even years. It has been remarked that the effects of this disease continue longest in those of a phlegmatic habit. In them indeed ulcerations of all kinds are generally less acute, but more obstinate than in others. " With regard " to constitution," says Dr. Fothergill, " it " may be observed that in soft lax leuco- " phlegmatic habits and languid inactive " dispositions, every thing else being equal, " the disease seems to proceed more slowly, " to go off more irregularly, and leave behind " it more lasting effects. In some persons

" of the temperament just described, though " the fever has grown less, and all the " symptoms abated in four or five days, yet " the sloughs in the throat have continued " almost a week after; whilst in the oppo" site constitution, though the disease has " been much more acute, yet the symptoms " have no sooner abated than the sloughs " have cast off and the ulcers healed of " their own accord."

2. Of the Causes of the Cynanche Maligna.

The cynanche maligna is one of the few phlegmasiæ which are produced by a specific contagion. The proofs of its arising from contagion, and not from the causes of the other phlegmasiæ, are so generally known, that it is needless to insist upon them.

It is very generally allowed, that at one time the cynanche maligna was known in no part of Europe. Huxham, Mr. Russel,*

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* Mr. Russel, in his Œconomy of Nature in Acute and Chronic Diseases, quotes several passages from Hippocrates, in which he thinks this complaint is mentioned.

Lieutaud, and others, maintain that it was known to some of the ancients. Lieutaud says, that Aretæus was the first who gave any account of it. It is the opinion of most writers, however, that the cynanche maligna was wholly unknown to the ancients, and that the complaint mentioned by Aretæus under the name Ulcera Syriaca was of a different nature from the malignant sore-throat. The dispute is of too little importance to induce us to enter minutely into its merits.

Dr. Fothergill * was at some pains to trace the rise and progress of the cynanche maligna in Europe in modern times. It appeared first in Spain about the year 1610; and spread thence to Malta, Sicily, Otranto, Apulia, Calabria, and Campagnia, in the space of a few years. It broke out at Naples in 1618, and continued to rage in different parts of that kingdom for no less than twenty years.

Ludovicus Mercatus, physician to Philip II, and III, kings of Spain, published a

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* See the beginning of his Paper, entitled, Of the Sore-Throat attended with Ulcers.

treatise on the cynanche maligna, in the fifth volume of his works in 1612. Andreas Sgambatus, a physician of Naples, wrote a treatise on it in 1620. Baptista Cortesius described the cynanche maligna about the year 1625. Eleven years after, Oetius Cletius of Signia published a treatise De Morbo Strangulatorio, the name which he gives the cynanche maligna. In 1643 Aurelius Severinus, professor of anatomy and surgery, and physician to the hospital of incurables at Naples, published a dissertation on the same complaint. Petrus Michael de Heredia, physician to Philip IV of Spain, also wrote on the cynanche maligna; Dr. Fothergill has not been able to discover the precise date of his work. Thomas Bartholine published a treatise on it in 1646.

After the time of these authors, the cynanche maligna seems to have disappeared for many years. The first accurate accounts we have of it after this period were published near our own times.

Dr. Fothergill does not consider the affections of the throat, described by Wierus, Forestus, and Ramazzini, as the true cynanche maligna, nor does he esteem as such the scarlet fever and sore-throat which raged at Edinburgh in 1733, an account of which the reader will find in the third volume of the Medical Essays.

There is a complaint which resembles it, shortly described by Tournefort, in his Voyage to the Levant; he calls it a carbuncle or plague-sore at the bottom of the throat, attended with much fever; but his account of the complaint is so imperfect, that Dr. Rutty and some others think it bears a stronger resemblance to the cynanche trachealis.

Dr. Fothergill seems to have overlooked Morton's account of a scarlet fever which raged in London towards the end of the 17th century, and was very different from the mild form of this disease described by Sydenham. "Cæteraque," Morton observes of this complaint, "anginæ et peripneumoniæ symptomata sæpius ingravescunt." What he says in the next sentence is very characteristic of the cynanche maligna. After the eruption, he remarks, the complaint often changes to a malignant form, and then it is highly dangerous; cough, phthisis, ophthalmia, obstinate and colliquative diarrhœa, strumous affections, cachexy, leucophlegmatia, and ascites, often supervene.

Notwithstanding the frequent occurrence of cynanche maligna in our days, few of the circumstances which predispose to it are ascertained. Adults are less subject to it than children, and when they are attacked with it generally have it in a milder form. Dr. Fothergill says he never knew an adult attacked with the cynanche maligna while in health and vigour, in whom it proved fatal.

It has also been maintained, as of the scarlatina, that women are more subject to it than men, and girls than boys; the accuracy of this observation however is at least doubtful.

Those of a weak and lax habit of body appear to be more subject to it than the robust and firm. "If adults," says the author just mentioned, "are seized with the "cynanche maligna, they are commonly "such as have been very much conversant "with the sick, or else are weak and infirm; and it seems to affect those adults "in the severest manner who have been "previously indisposed, or whose strength "has been reduced by unseasonable or immoderate evacuations." This circumstance Dr. Fothergill regards as assisting to form the diagnosis between the cynanche maligna and the cynanche tonsillaris, which most frequently attacks the healthy and vigorous, and in them runs highest.

Autumn and the beginning of winter are the seasons at which the cynanche maligna most frequently rages; it sometimes however prevails without interruption for several years.

The reader will find the state of the weather in the summers preceding the appearance of this complaint particularly noticed by writers. It would appear however that, if we except an unusual degree of warmth and moisture, there is no state of the weather, which we can detect, that particularly predisposes to it.

The circumstances which tend to increase its virulence are the same with those which increase the virulence of common typhus, warm and moist weather, a sickly habit of body, putrid effluvia, particularly those arising from a number of people being crowded together, especially a number of those labouring under the disease, and every other cause of irritation, whether making its first impression on the mind or body.

It has been observed that the cynanche maligna, like the plague, and indeed most other epidemical diseases, is most fatal on its first appearance, gradually becoming milder, till towards the end of the epidemic it is scarcely attended with any danger.

It has also been frequently observed of this, as of most other epidemics, that other complaints seldom prevail much while it rages, and that those which do appear partake of its nature. The reader will find it observed by Huxham,* Rush,† and others, that while the cynanche maligna raged, sore throats of all kinds, in different cases, approaching more or less to the nature of this complaint, were more frequent than other diseases; and the former farther observes, that there was a surprising tendency to eruptions on the skin, and to aphthæ in all kinds of fevers.

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* Huxham on the Ulcerous Sore-throat.

† Med. Obs. and Inq. by Dr. Rush.

3. Of the Treatment in Cynanche Maligna.

The treatment admits of the same division with the symptoms of cynanche maligna, into general and local. To avoid interruption, I shall defer till after these have been laid before the reader, the few observations to be made on the treatment of certain troublesome symptoms, obstinate vomiting, diarrhœa, &c. which frequently attend this complaint, but are not essential to it. We are in the first place then to consider the local treatment in cynanche maligna.

As there are no cases of this disease in which local remedies alone are sufficient, there is not here the same reason for considering the local, before the general treatment, as in the cynanche tonsillaris. The local, however, is always the simplest part of the treatment, and it will assist the memory to pursue the same mode of arrangement in laying down the treatment of the different species of cynanche.

Of the local remedies used internally.

Those most generally employed are gargles. Many of those mentioned in treating of the cynanche tonsillaris are used here. But the articles which have been termed antiseptic, and the more acrid applications, are most successful in cynanche maligna.

The early writers on this disease, abovementioned, employed many articles in the composition of their gargles, some of the most active of which only have been retained in modern practice.

During the first stage of the disease they recommended various articles, which have been termed repellents, mild acetous liquors, a decoction of barley with vinegar, the juice of the pomegranate or mulberry, &c. When white sloughs appeared, they prescribed a decoction of lupins, vetches, &c.

with honey of roses; when the throat was ulcerated, myrrh or alum mixed with honey of roses, the unguentum egyptiacum in barley-water, the green and blue vitriol, or the diluted sulphuric or muriatic acids. Even arsenic and the actual cautery were occasionally recommended.

As soon as the symptoms were mitigated and the ulcers had lost the gangrenous appearance, they employed gently astringent gargles, and directed the patient to receive into the mouth the fumes of various substances thrown on live coals.

In the cynanche maligna, as in the other species of sore-throat, we readily determine the composition of the gargle by reflecting on the ends we have in view in prescribing it. Two purposes are served by the employment of gargles in the cynanche maligna; we must frequently wash out the acrid matter secreted in such quantity, which, if allowed to remain in the fauces, at once occasions the spreading of the complaint and disposes to gangrene, and, if swallowed, produces still worse effects; while we must, at the same time, more directly counteract the tendency to gangrene by the stimulating property of the gargle.

But as it is impossible, let their employment be as frequent as we will, entirely to wash out the acrid matter constantly secreted in the fauces, the gargles should be mucilaginous, in order, as far as we can, to defend the fauces from its action.

There is still another purpose served by gargles in the cynanche maligna, which the reader will find particularly insisted on by the best writers. It is to support the secretion of this very matter; for however formidable its effects in the fauces and other parts of the alimentary canal may be, those to be apprehended from its sudden failure, or even from a sudden and considerable diminution of it, are still more formidable.

It is true indeed that the same gargle will not answer all the foregoing indications. The stimulants which we employ with most success for the purpose of checking gangrene, namely, those termed astringents, so far from promoting the discharge of mucus from the fauces, tend to impede it.

It therefore requires some attention after we are made acquainted with all the articles employed in the composition of gargles in this disease, to suit them to the circumstances of the case.

We must be directed by the general tendency of the symptoms. If the flow of mucus has been considerable, if it be suddenly diminished, and especially if any of the symptoms which usually attend such an accident supervene, our measures must be chiefly directed to restore this evacuation. It will then be proper for some time wholly to lay aside the use of astringent gargles. If, on the other hand, the secretion of mucus continues considerable, or has never been so, even although the tendency to gangrene be not very evident, the astringent gargles will generally be found the best.

As other stimuli, which may be termed acrid, tend to counteract any hurtful tendency of astringents, and at the same time rather co-operate with them in checking the tendency to gangrene; it is proper in all cases to employ the former.

I may observe by the bye, that the case before us alone is sufficient to point out the error of Dr. Brown in supposing that all substances capable of exciting the living animal solid, act in the same way. When the secretion from the fauces fails, will extract of oak-galls and diluted alcohol (both powerful stimuli) produce the same effects?

There are two kinds of gargles then employed in the cynanche maligna, those composed of acrid, or as they are generally termed stimulating substances, and those composed of these and another class of stimulants, termed astringents.

There is perhaps no case of cynanche maligna in which it is proper to employ gargles merely astringent. Powerful as the Peruvian bark is, a plain decoction of it is far from being a proper gargle in any stage of this complaint.

Among the substances best fitted for the composition of acrid gargles, are the capsicum, myrrh, marine acid, wines that are not astringent, or diluted alcohol in any other form. Except where our view is particularly directed to increase the secretion from the fauces, a mixture of port wine and finely powdered bark, or the watry extract of bark dissolved in port wine, is perhaps the best gargle we can employ. As soon as the nature of the complaint is determined we should have recourse to this gargle, the frequency of its employment being regulated by the severity of the symptoms. We do not here dread the motion of the fauces in gargling, as in the worst cases of the cynanche tonsillaris. In the cynanche maligna the inflammation generally falls below the degree most favourable to suppuration, so that slight causes, tending to increase it, are not to be dreaded.

We often however have a more perplexing difficulty to struggle with in the cynanche maligna. It is impossible to make children, the most frequent subjects of this complaint, wash their mouth with a gargle and spit it out. We can generally indeed make them swallow a little extract of bark mixed with wine, which is not only a good application to the fauces, but we shall find an excellent internal medicine; but exhibited in this way, it is far from answering the purposes of a gargle, one of the chief of which, we have just seen, is cleansing the throat and preventing the acrid matter from being swallowed. Instead of obviating the symptoms arising from this cause, we are promoting them by constantly exciting swallowing. Many judicious practitioners who have been conversant with this complaint, think that its greater fatality among children than adults, is in a great measure to be attributed to their swallowing the morbid secretion from the throat. This it was observed above, induces vomiting, griping pains, and purging of the worst kind, by causing the complaint to spread along the alimentary canal ; and it is very frequently by these symptoms that children are destroyed. These symptoms may in some measure be prevented by from time to time removing the acrid matter by a small spunge at the end of a piece of wood, and by means of another spunge at the other end the ulcerated fauces may be touched with the mixtures best calculated to promote their healing. There is no necessity for using these mixtures in such quantity as to excite swallowing.

Besides the use of gargles, where the

sloughs are numerous and extensive, practitioners have had recourse to other means to promote their separation.

The older practitioners having observed that the separation of the sloughs is generally attended with a mitigation of all the symptoms, concluded, by a very inaccurate mode of reasoning, that could they by any means procure their separation, the same good effects would attend it, for they did not regard the separation of the sloughs merely as a symptom of returning health, but as the cause of every change which they observed to attend it. On this opinion was founded a practice, the bad effects of which seem now sufficiently ascertained; they endeavoured forcibly to rub off the sloughs with the finger or an instrument. This practice indeed has been followed even by some late practitioners. But the observations of Dr. Fothergill and others sufficiently warn us against it. " In a case " where I was concerned," he observes, " previous to my being called in, a surgeon " had endeavoured to separate the sloughs " by the assistance of his probe. He succeeded

“ ceeded in his attempt without much difficulty,
“ but was surprised to see the same
“ parts covered the next day with thick
“ dark ash-coloured sloughs penetrating
“ deep into the substance.”

If, after the use of the foregoing gargles has been continued for some time, we do not find the sloughs beginning to separate, all that can be done is to touch them with some more acrid preparation, the mel æruginis, the powder of myrrh, alum, or the marine acid mixed with honey, &c. applied with a pencil or a small piece of rag. It is perhaps unnecessary for me to remark after what has been said, that in this, as in all other gangrenous affections of the throat, the gargles and other applications to the fauces should be tepid.

The vapour of water variously impregnated has long been a favourite remedy in cynanche maligna. The patient is directed to breathe the steam arising from an infusion of myrrh, camphor, red roses, camomile flowers, &c, in boiling water or vinegar.*

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* See Huxham and others on this complaint.

In modern practice however these means have been superseded by the foregoing.

The only remaining remedy of any consequence applied to the internal fauces in cynanche maligna, is scarification of the parts occupied by the sloughs, which seems upon the whole to do more harm than good.

Of the Local Remedies used externally.

We less generally find occasion for applications to the external fauces in the cynanche maligna, than in the form of cynanche last considered.

As the pain and swelling are seldom considerable, local blood-letting is rarely to be recommended; when they are considerable, which now and then happens at the commencement, local is preferable to general blood-letting even where the pulse is full. In this, as in all similar cases, leeches are preferable to other modes of local blood-letting.

Scarification and cupping of the shoulders and back of the head have been employed in order to remove the pain in this part of the head, but as far as I have been able to perceive, Dr. Fothergill observes, without much benefit. Dry cupping has also been recommended, but does not seem to have been attended with better success.

Blisters are warmly recommended by many writers of eminence; they are particularly serviceable, it is said, in removing the faintness which often accompanies cynanche maligna. The generality of practitioners however have been led by observation to dissuade from their employment. At an early period their application can be of little service; we seldom have it in view to moderate the inflammation, and when this indication presents itself, it is more immediately answered by local blood-letting. At a later period the application of blisters in the cynanche maligna is frequently followed by mortification. Dr. Clark observes, that he employed blisters in only one case of this disease, and the blistered parts became gangrenous. Mr. Colden and others experienced the same effect from them, and with respect to removing faintness, we shall presently find that we are possessed of much more powerful means for this purpose.

Rubefacients may be employed at least with more safety; the reader will find them particularly recommended by Quarin, in those cases where the tumor of the glands in the neighbourhood of the fauces is considerable.

Such are the local means employed in the cynanche maligna; it is chiefly however on general means that we rely for the cure of this complaint.

The reader cannot avoid remarking much affinity between the symptoms of cynanche maligna and the aphthæ infantum. In that part of the treatment of the cynanche maligna which has been considered, the resemblance of the two complaints is also striking; in what remains to be said, it will be found no less so.

Of the general Means employed in Cynanche Maligna.

The first part of the general treatment in cynanche maligna which demands attention, is diet. At the commencement of this disease, the general excitement sometimes, though rarely, runs high; the diet must then be diluent and cooling. In the majority of cases however, deficiency of excitement is what we dread at all periods, and the diet should be the same as in typhus.

Mr. Colden and some other writers declare that they have found animal food of every kind hurtful in cynanche maligna. This has been a prevalent opinion respecting all kinds of malignant fevers, it having been taken for granted that as animal substances are more apt than vegetable to run into the putrefactive fermentation, they cannot fail to increase the symptoms of putrescency; but if the symptoms termed putrid are only the effects of debility, as all the phenomena of fever seem to shew,* whatever is best calculated to support the vigour of the system, is best calculated to obviate or remove these symptoms. When the symptoms of fever are considerable indeed, whether those of synocha or typhus, animal food is injurious; in the one case proving too strong a stimulus, in the other too powerful an atonic.*

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* See what was said on this subject, in the first vol.

As almost every thing said on the management of all the other natural agents as well as diet, in treating of synochus, is applicable here, a few remarks on some of the most important will be sufficient.

The prejudice in favour of general evacuations has extended to the cynanche maligna. It is chiefly at the commencement of the complaint however, that they have been recommended, for even the older practitioners regarded evacuations as inadmissible at an advanced period. Later experience has evinced that this set of remedies, with the exception of a few rare cases, are dangerous at all periods of the complaint. Dr. Fothergill, who was prejudiced in their favour, confesses that even in cases of cynanche maligna where they seem indicated, they are of little service, and should be avoided. " In some of the first cases I met " with," he observes, " the quickness of " the pulse, the degree of heat, the appa-

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* See the observations on the diet in continued fever, in the first vol.

“ rent inflammatory redness of the eyes “ and face, and pain in the head, some- “ times urged me to employ bleeding, es- “ pecially if there were any marks of ple- “ thora, but in these cases it did not appear “ to have any advantageous effects, so that “ notwithstanding the vehemency of the “ symptoms above mentioned, it seems “ proper in general to omit this evacua- “ tion.” In another place the same author observes, “ it will not perhaps be diffi- ‘ cult from such a comparative view to dis- “ tinguish this disease from a common sore- “ throat, or an inflammatory affection of “ those parts in most instances; but there “ is another no less certain criterion, though “ too often a fatal one, which is the con- “ stant increase of symptoms upon bleeding, “ purging, and the liberal use of cooling “ antiphlogistic medicines, a method which, “ as it seldom fails to remove a genuine in- “ flammation, if it is early enough and “ assiduously pursued, so it is too often in- “ jurious in the present case.”

It is needless to repeat the observations of Huxham, Quarin, Cullen, and indeed all the best writers on the complaint, to the same purpose. "The consequence of evacuations," says Mr. Colden, "is an insurmountable tendency to mortification, "so that the very orifice made by the lancet "mortifies.

The only case in which Quarin admits of venesection in cynanche maligna, is that in which pneumonia supervenes,* and even here he cautions against repeating the blood-letting too frequently, and insists on a circumstance which I have more than once had occasion to mention, that the appearance of the buffy coat does not always warrant a repetition of blood-letting, for under this coat, he observes, there is often a tender black crassamentum, the parts of which scarcely at all cohere. "Hinc patet," he adds, "quam graviter errant illi, qui ob "solam adparentem in sanguine crustam, "venæsectionem aut largiorem instituunt "aut eam repetunt." †

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* This case nearly resembles the pneumonia putrida of foreign writers, which will be considered in treating of pneumonia.

† Quarin De Febribus.

One circumstance particularly demands attention; when the affection of the fauces has spread to the trachea, the difficulty of breathing it occasions may be mistaken for pneumonia, and venesection be recommended when it is the most fatal step we could take. Hence probably it is that Dr. Fothergill remarks, that the heat, restlessness, delirium, and difficulty of breathing, which this evacuation commonly prevents or mitigates in other cases, in this are increased by it. Nor does the swelling, he here adds, of the tonsils, fauces, &c. seem to receive the least benefit from it; on the contrary, though the fullness of these parts decreases, yet the sloughs thicken and change to a livid or black colour, the external tumor grows large, and the spitting commonly diminishes.

The last remark which I shall make on blood-letting in the cynanche maligna is, that we have not here even that argument for its employment which has been so often urged in some other cases of typhus, that a spontaneous flow of blood frequently brings relief, for, in the case before us, hemorrhagies,

hagies, we have seen, from whatever part of the body they occur, are almost uniformly prejudicial.

The inference from all that has been said is plain, that whatever blood-letting may be in other cases of phlegmasiæ, it is not a remedy suited to the cynanche maligna. Thus we find this complaint in its mode of treatment, as in its causes, differing essentially from the diseases with which it is classed.

What has been said of blood-letting is with little change true of purging. We are sufficiently deterred indeed from the use of this remedy in cynanche maligna, by observing that a spontaneous diarrhœa always does harm, and often proves fatal. A tendency to diarrhœa, we have seen, also prevents the free use of cathartics in the aphthæ infantum. In this complaint, which is often produced and more frequently accompanied and increased by foulness of the prima viæ, we are often forced to the employment of cathartics at the commencement. In the cynanche maligna we seldom have this inducement to recommend them at an early period, so that the regular expulsion of the fæces should be solicited by clysters only, unless the inflammation of the fauces runs high.

In those cases which approach to the nature of scarlatina, gentle laxatives at the commencement are proper, and, unless the excitement run very high, preferable to blood-letting. Mercurial cathartics in such cases are particularly recommended by Dr. Rush. But wherever the complaint at all partakes of the nature of cynanche maligna, cathartics must be employed with caution. In all cases the constitution of the patient, and the nature of the prevailing epidemic, must influence our practice. It has often happened in this complaint, from want of a due attention to these, that even a mild cathartic, under circumstances in which it did not seem a doubtful remedy, has been followed by a retrocession of the eruption, and a train of the most alarming symptoms.

It was observed of the aphthæ infantum, that however dangerous the employment of cathartics, and however much to be dreaded spontaneous diarrhœa is, during the greater part of the complaint, yet that when the latter occurs towards the termination of the complaint, and after the febrile symptoms are nearly removed, it ought to be encouraged, and that if it does not, the exhibition of cathartics is necessary, in order to cleanse the intestines from the sordes accumulated in them during the disease. The same may be said of the cynanche maligna. Towards the termination of this complaint also, the stomach and bowels are often loaded with irritating matter, particularly when the sloughs have spread to these cavities. However ill adapted to the commencement of cynanche maligna, Quarin observes, cathartics may be, they become necessary towards its termination, in order to expel from the bowels the putrid colluvies, by which the fever is protracted, the appetite destroyed, the abdomen swelled, and glandular obstructions formed.

Yet, as in the aphthæ infantum, the use of cathartics even at this period requires caution; we must not mistake a temporary remission of the symptoms for a solution of the disease. A healthy appearance of the throat, and an abatement of all the febrile symptoms, must insure us of its safety, and we must employ only the mildest cathartics.

Emetics, says Dr. Cullen, both by vomiting and nauseating, prove useful, especially when early employed. The advantage derived from emetics at the commencement of the cynanche maligna, has been remarked by practitioners from its first appearance in Europe. It is chiefly, if not solely, however, at the very commencement of the complaint that they are serviceable. At a more advanced stage the effects of vomiting are too debilitating, and the danger of inducing hypercatharsis renders the use of nauseating doses precarious. We find many condemning all kinds of antimonials in this complaint, which, even when the view is to produce vomiting, are given in small and repeated doses.

One principal evacuation still remains to be considered, that by the skin. Physicians have not in the cynanche maligna, as in many other febrile diseases, endeavoured by the hot regimen to induce sweating, the bad effects which would have attended this practice were too apparent. Diaphoretics however have been generally recommended, and, although not to be ranked among the most powerful medicines in this complaint, are often serviceable. Of these the preparations of opium are the most powerful, and as they tend to procure sleep, and check the tendency to diarrhœa, they are valuable medicines in cynanche maligna.

Nitre and other neutral salts have been very generally recommended for the same purpose. I have already had occasion to remark however, that this class of medicines seem generally to do harm where the symptoms of typhus are well marked. "Nitrous cooling medicines," Dr. Fothergill observes, "frequently produce the like effects; they increase that faintness which "accompanies this disease, and either dis-"pose the patient to copious sinking sweats "or to stools." The reader will also find the use of this class of medicines in the cynanche maligna reprobated by Dr. Johnstone and others.

The pediluvium has been frequently employed in this disease for the purpose of promoting perspiration; at an advanced stage its effects are too debilitating, and at all periods, if the symptoms run high, the trouble attending its use more than compensates for any good effects it may have. In milder cases it is often serviceable.

With respect to the long list of diaphoretics enumerated by authors, many of which I have had occasion to mention at different times, they are upon the whole very feeble medicines in the cynanche maligna, and when given freely, by oppressing the stomach, often do harm.

The most powerful set of medicines, those which increase the general excitement, on which practitioners now almost wholly rely in the treatment of this disease, still remain to be considered.

Cordials, or rather medicines which they termed cordials, were much employed by the older practitioners. These indeed and gentle diaphoretics, if we except evacuations, were the chief general means they employed, for they did not seem aware of how much the state of the throat in this disease depends on that of the system in general;

and finding the danger always proportioned to the violence of the local symptoms, they regarded local remedies as those to which they were almost solely to trust.

They employed many articles as cordial and alexipharmic, most of which are possessed of little or no virtues, such as the bezoar stone, a concretion found in the stomach of some animals of the goat kind, which seems to possess no other medical virtue but that of a very weak antacid, and may be taken without any sensible effect in the dose of some drams, although generally prescribed in that of a few grains; the Armenian bole, a gently astringent earth; various precious stones; the juice of various fruits; the flower of the bugloss, one of those flowers called cordial, but now deservedly neglected; borage, endive, scordium, scorzonera, scabiosa, &c.

Is it not surprising that the Italian and Spanish physicians, who first treated the cynanche maligna, should employ these articles with the express view of restoring the vigour of the system, and very generally neglect the best of all cordials which their climates offered them in such abundance, the various kinds of wine? Need we wonder that experience taught them to trust but little to their general remedies? Some indeed recommended medicines from which rather better effects might be expected, the carduus benedictus, ammonia, various aromatics, and even a little wine.

Warm aromatic and cordial medicines are still much recommended in cynanche maligna, and it has justly been observed, that when the throat assumes a gangrenous appearance, and the debility indicated by depression and faintness is considerable, we must not be deterred from the use of such medicines, either by the great frequency of the pulse, or increase of temperature. Complex formulæ were once much employed in all diseases, and many still recommend a variety of ingredients for the composition of these medicines, but it seems now to be the opinion of most practitioners that their effects are very generally proportioned to the quantity of wine and bark they contain.

The most judicious practitioners therefore have almost wholly laid aside the use of other articles, as producing hardly any other effects but those of exciting disgust and oppressing the stomach, and thus preventing the patient taking the necessary quantity of the bark and wine.

The rules for giving the bark and wine are the same as in typhus, except that, on account of the presence of gangrene, the bark is given in larger quantity, always in the well marked cynanche maligna in as large quantity as the stomach will bear.

Since these medicines were given with freedom, physicians have changed their opinion of the comparative effects of local and general means in this complaint. They have found that no applications to the fauces are of such moment as large doses of bark and wine received into the stomach, and if we can judge from what we now see, the cynanche maligna must have been fatal indeed before these medicines were recommended.

It is almost needless once more to observe, that the plain powder is the best preparation of the bark; but unfortunately we cannot always prevail on the patient to take it, and it often oppresses the stomach.

It is frequently impossible to persuade children, the most frequent subjects of this disease, to take the bark in powder. Dr. Clark gave a decoction of it with a sixteenth part of spirituous cinnamon water sweetened with extract of liquorice, or accidulated with lemon juice, or the vitriolic or marine acids, and "in one or other of these "forms," he observes, "it very seldom "happened but the youngest patient could "be prevailed upon to use it." To this preparation he gradually added more and more of the powder, as he found the patient could be made to take, and the stomach would bear it.

Dr. Fothergill endeavoured to remove the difficulty in another way. "The difficulty," he observes, "of prevailing upon "children affected with this distemper to "take any kind of medicine, put me early "on trying the bark in clysters, and some-"times when there seemed very little "chance of relieving them by any means. "To very young children, two or three "drachms of the bark in fine powder have "been given every six hours in three or "four ounces of broth as a clyster, adding "a small quantity of the electuarium e scor- "dio to the second or third, if the first "was discharged too speedily."

The use of the bark, we have seen on other occasions, is sometimes attended with costiveness, and sometimes with purging. In the case before us, the former effect should be obviated by clysters only, and even these ought not to be too frequently repeated. The latter effect must be obviated by very vigorous means, which we are presently to consider.

With regard to the barks or other medicines to be had recourse to when the Peruvian bark fails, or cannot be procured, I may refer to what was said in treating of intermitting fevers. The observations then made are applicable here, with the exception of what was said of metallic and saline preparations, almost all of which, we have reason to believe, would prove hurtful in cynanche maligna.

One article however which has been lately introduced into the treatment of this complaint demands particular attention. I have already had occasion to mention the capsicum among the local remedies employed in the cynanche maligna, but it would appear from a variety of observations, that it is more successful when used internally. It has been given in very considerable doses, and in some epidemics seems to have succeeded better than the bark. There has not however been a sufficient number of trials to ascertain the cases to which it is best adapted.

Mr. Steuard * was one of the first who prescribed the capsicum internally in the cynanche maligna. He directs two table spoonfuls of the small red pepper, or three of the common Cayenne pepper, and two tea spoonfuls of fine salt, to be beat into a paste, on which half a pint of boiling water is poured, and strained off when cold; an equal quantity of very sharp vinegar being added to this infusion, a table spoonful of the mixture every half hour is a proper dose for an adult; and to this, we

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* See the 12th vol. of the Medical Commentaries.

are informed, cases yielded which had resisted the bark and wine. Under Mr. Stephen's case it was also exhibited with the best effects to 400 patients, and seemed to save some whose state was thought desperate before they had recourse to it.

In Mr. Collins's paper on the cynanche maligna the reader will also find the superiority of the capsicum to the bark maintained. Mr. Collins at first gave the bark and capsicum together, but by subsequent trials he was led to trust to the latter alone.*

Swallowing the infusion, he observes, occasioned slight convulsive motions, and a sensation of heat in the œsophagus and stomach, and in a short time after it was swallowed, it produced a general glow over the body, but without considerably affecting the pulse. Mr. Collins used Mr. Steuart's preparation of the capsicum, but he thinks there is no occasion to make the dose so large, smaller doses answering equally well.

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* Mr. Collins also mentions cases of intermitting fever which yielded to the capsicum.

It only now remains to make a few observations relating to certain symptoms, the treatment of which does not come under the general plan of cure, namely, diarrhœa whether spontaneous or induced by the unguarded use of cathartics, obstinate vomiting, hemorrhagies, suppression of urine, which occasionally attends all diseases of debility and dyspnœa.

The means for stopping diarrhœa are, 1st, Such whose action is confined to the intestines, either diminishing the secretion from their surface and allaying the peristaltic motion, or exciting them to a more speedy evacuation of the offending matter, or tending to correct its morbid properties. 2dly, Such as act on other parts of the system, there exciting certain motions in some measure incompatible with those supporting diarrhœa; and lastly, those which tend to restore the general vigour of the system.

The means answering these different purposes I have already, on different occasions, had an opportunity of mentioning. The means which diminish the peristaltic motion and the secretion from the surface of the intestines, are opiates and astringents. These are indicated on the appearance of diarrhœa at any period of the complaint, except in the decline of the disease, when the diarrhœa, we have seen, is salutary, not only by evacuating the noxious matter which accumulates in the primæ viæ during this disease, but tending to prevent or moderate the anasarcous swelling which frequently follows it.

Of those which excite the intestines to increased action, that the offending matter may be the more speedily evacuated, rhubarb and aloes are the best, because, while they evacuate the contents, they tend to restore the vigour, of the alimentary canal. They are chiefly indicated in diarrhœa at the decline or commencement of the complaint, for in its progress we are in no case perhaps to risk a hypercatharsis by promoting the diarrhœa, from whatever cause it may proceed.

With regard to correcting the morbid properties of the contents of the primæ viæ, there is nothing to be added to what I have more than once had occasion to say. At all periods of the complaint acids are proper if the stomach and bowels are loaded with bile; if with acids, absorbents.

The means which excite motion in some measure incompatible with catharsis, and thus tend to allay it, are diaphoretics and emetics. Of the diaphoretics employed in this complaint, opium, it has already been observed, is the most powerful, so that in this way also as well as by its action on the bowels, it tends to check diarrhœa. It is proper, when the tendency to diarrhœa is considerable, to avoid the application of cold, but even here much warmth is inadmissible.

Emetics often have a considerable effect in checking diarrhœa, partly by counteracting the peristaltic motion, and partly by promoting perspiration. Their debilitating tendency however renders them admissible only at the commencement of the complaint, at which, we have seen, they are otherwise indicated.

With regard to the means which tend to check diarrhœa by restoring the vigour of the system, there is nothing to be added to what has just been said of them.

Vomiting seldom proves obstinate in this complaint, nor does it frequently occur under circumstances which should induce us suddenly to check it. It generally arises from the presence of irritating matter in the stomach, and when it occurs at the commencement should be encouraged by camomile tea, or even a dose of ipecacuanha. Dr. Fothergill recommends for this purpose an infusion of green tea or carduus benedictus, and observes, that by this method he has seen the disease go off with much more ease than was at first expected. On the evacuation of the offending matter the vomiting generally ceases; when it does not, a saline mixture in a state of effervescence often allays it; or a clyster sometimes succeeds; for as an emetic tends to check catharsis, catharsis tends to check vomiting. If these means fail, a dose of solid opium, or opium and camphor, will generally prove successful. If it is rejected, it must be repeated till retained.

Hemorrhagies, particularly in the advanced state of the disease, we have seen, are among the worst symptoms. They not only demonstrate the progress which the complaint has made, for in this disease they are almost always the consequence of debility, and very frequently indicate gangrene, but they produce the same effects which might be expected from artificial blood-letting employed at the most improper period of the disease.

In hemorrhagy from the throat or any part of the head, the nose, mouth, ears, &c. a mild clyster should be exhibited, and the patient kept as much in the erect posture as he can easily bear. In all cases of hemorrhagy he must be kept as cool as possible, so as not to risk an alarming diminution of temperature; the quantity of bark and wine must be increased, and their effects aided by the addition of alum or vitriolic acid; while we apply cold vinegar and water and astringents, by means of tents or otherwise, as near as we can to the orifices of the bleeding vessels. If these means fail, the hemorrhagy, for the most part, soon proves fatal; and when they succeed, their effects are often transitory.

In suppression of urine also a mild clyster is the first expedient, and if the patient has been long costive, some cathartic ingredients should be added to it. Emollient fomentations, or cold applications on the region of the bladder, are sometimes successful. It has just been observed, that in the cynanche maligna this symptom is very frequently the consequence of debility. I have seen it nearly induced where there was no complaint but debility from want of food. Suppression of urine therefore in this disease generally indicates the necessity of pushing as far as possible the invigorating plan. If other means fail, we must call in the assistance of the surgeon, which should not be too long delayed. It is of consequence in preventing this symptom, frequently to remind the patient of emptying the bladder; suppression of urine is most apt to supervene when the muscular fibres of the bladder are stretched.*

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* See what was said of this symptom in speaking of the treatment of small-pox.

Of dyspnœa little need be added to what has already been said. If accompanied with pain in the thorax, there is reason to believe that it proceeds from inflammation of the lungs, and it must be treated accordingly. It may proceed from this cause indeed although unattended with pain; the nature of the case is then ascertained with much difficulty.*

If the dyspnœa proceeds from the swelling of the glands about the fauces, we must, as in other similar cases, have recourse to local blood-letting and blisters, if the state of the patient will admit of it; if it will not, fomentations and rubefacients are the best substitutes. Mr. Colden recommends in this case fomentations with bitter and aromatic herbs. If such means fail and suffocation is threatened, bronchotomy is the only remedy.

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* See what will be said of pneumonia in the next volume.

SECT. III.

Of the Cynanche Parotidea.

THE Cynanche Parotidea, called in English the Mumps, is generally so mild a complaint as not to require the assistance of the physician; it will not therefore be necessary to consider it much at length. It is defined, we have seen, by Dr. Cullen, that species of cynanche in which there is great external swelling from an enlargement of the parotid and maxillary glands, the respiration and deglutition being little disturbed, and the fever, for the most part, a gentle synocha.

This short account of the symptoms is sufficient for ascertaining the presence of the disease. The prognosis is uniformly good, with one exception, which is the only case that requires any particular attention.

Towards the termination of the cynanche parotidea, that is, about the fourth day, when the swelling of the glands about the fauces begins to abate, some degree of tumor frequently affects the testicles in men, and the breasts in women. Sometimes, though not frequently, they become very hard and painful, in general however with little fever.

But it now and then happens either when the tumor of the breasts or testicles does not succeed that of the glands about the fauces, or when the former does succeed the latter but suddenly recedes, that the fever, which has been very mild from the beginning of the complaint, and which generally abates when the swelling of the fauces begins to recede, suddenly becomes considerable, is sometimes attended with delirium, and has even proved fatal.

This species of cynanche, like the last, is frequently epidemic, and evidently arises from contagion. Children are the most frequent subjects of it. I have seen hardly one escape it, in a school of about five hundred boys.

In its usual form it hardly requires any particular mode of treatment. If we except a cooling cathartic, avoiding animal food and exposure to cold, is all that is necessary.

When the train of symptoms just alluded to supervene, it requires more attention. With the mode of treatment however the reader is already acquainted, as it differs in no respect from that of common synocha, in which the same degree of excitement prevails, with the addition of local remedies to bring back the swelling to the breast or testicle if it has receded. The continued application of warm fomentations is the best means of recalling it.

Whether or not fomentations applied to the breasts or testicles would prove serviceable where this train of symptoms supervenes without having been preceded by any swelling of these parts, has not been ascertained.

APPENDIX.

AN

EXPERIMENTAL INQUIRY

Into the Circumstances

Influencing the Urinary Depositions

WHICH APPEAR

IN FEBRILE DISEASES.

BEFORE I proceed to relate these experiments,* it is necessary to take notice of the following circumstances. They were made at different times, and they were not all performed with the same degree of accuracy. All of them, however, seem sufficiently accurate to enable us to determine with certainty concerning the result. Besides, every point is proved by the more accurate experiments, and their result confirmed by others less so. The chief circumstance wherein the inaccuracy of these last experiments consists, is, that I did not take notice of the state of the thermometer while they were performed; but as hardly any of them lasted above three days, it is not probable that the temperature could vary much: and as it must be evident, from considering the experiments where the state of the thermometer is mentioned, that even considerable changes in this did not vary the result; it will appear, that every experiment I am to relate has been performed with all the accuracy requisite. Where the thermometer was used in any experiment, the state of it is generally mentioned every day till the urine was examined; although, in relating the experiment, the deposition of the urine is always mentioned on the day on which it was made, that the result may be the more easily perceived. With regard to the state of the persons on whom these experiments were made, their particular situation at the time is afterwards mentioned. It is enough at present to observe, that none of them had ever been troubled with any calculous affection.

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* The following experiments were made with a view to determine the circumstances which give a predisposition to urinary gravel, and were first published in 1792.

EXPERIMENT I.

IN this case, as well as in all the other experiments which I am to relate, I kept the dishes containing the urine in a place at a distance from any fire, and consequently little subject to changes of temperature.—The thermometer, where it is mentioned, stood in the same place.

The following experiment I made on myself when in good health.

Living partly on animal and partly on vegetable food, and at the same time taking a certain degree of exercise; morning, midday, and evening, I set apart a portion of urine in clean vessels. After these had stood 48 hours, I found in each of them a deposition, which had the appearance of a fine red sand, precisely similar to the brick coloured sediment which is deposited by the urine towards the decline of febrile diseases, and which, after Scheele, I shall call the *lithic acid*; the several depositions, taken together, weighed gr. j½.

On the following day, living in the same manner with respect to diet and exercise, I set apart, as formerly, portions of urine, which, after standing the same length of time, had also deposited gr. j½. of lithic acid; on the evening of this day I eat a lemon. Next morning I set apart a portion of urine, eating at this time a second lemon; about dinner-time I eat a third, and set apart another portion of urine; in the evening I eat another lemon, and set apart another portion of urine. All this day I had taken no animal product but milk, which is acescent, and had taken nearly the same quantity of fluid as on the former day, and the same exercise. After each of the above portions of urine had stood 48 hours, I found in them a deposition of lithic acid, amounting to gr. iij½. Next day I used the same regimen; and the portions of urine, after standing the same time, also deposited gr. iij½ of lithic acid; the depositions of the two last days not differing one fifth of a grain.

The portions of urine set apart on the different days of this experiment were exactly equal to one another; as were those in every experiment I am to mention; except where the whole urine made was kept. Either of these methods evidently gives a result sufficiently decisive. I also used, in all these experiments, vessels of a similar size, and similarly shaped; for the vessel exposing a larger or less surface to the air, evidently affects the deposition.

One fact, which seems curious, I observed to take place in this experiment, and as often as I examined my urine, at different times of the day, except in particular circumstances afterwards to be mentioned; the morning urine was darkest coloured, that made at mid-day next, and that in the evening palest.

EXPERIMENT II.

WAS made on a boy about 15, in good

health, which he enjoyed during all the experiments which I made on him.

Monday.

On getting out of bed, at 8 in the morning, he emptied the bladder. Having eat nothing before 9 o'clock, at that time he took for breakfast,

of bread,
of milk, *sing.* oz. viij.
of honey, dr. j.

At 11 in the forenoon, he set apart of urine oz. vj.; (Farenheit's thermometer standing at 29°.)

At 3 in the afternoon, he set apart of urine oz. vij. (therm. 29°.); at this time he eat of honey oz. j. About half past 3, he took for dinner,

of sour cream, oz. xvj.
of bread, oz. xj.
of sugar, dr. vj.

At 6, he made of urine oz. iij.; this was not kept.

At 7, he took of bread, oz. vj.
of milk, oz. viij.

At half past 8, he set apart of urine, oz. iij. All his urine this day was oz. xix, his drink being oz. xvj. beside oz. xvj. of sour cream, which was semifluid. All the three portions of this day's urine, after having been kept 48 hours, contained both crystals of lithic acid, and a cream-coloured sediment, which precisely resembled the furfuraceous sediment observed in the decline of febrile diseases, or at any period when there is much sweating. The crystals of lithic acid amounted to gr. ¾.

Tuesday.

On getting out of bed, at 8 o'clock in the morning, he emptied the bladder.
At 9 o'clock, he took for beakfast,
of bread, oz. viij.
of milk, oz. x.
of honey, oz. j.
At 11, he set apart of urine oz. vj. (ther. 32°.)
At 3, he also set apart of urine oz. vj. (therm. 32°.) At this time, he eat of honey oz. j.
At half past 3, he took for dinner,
of sour cream, oz. xij.

of bread, oz. x.
of sugar, dr. vj.
At 6 he took of bread, oz. vij.
of milk, oz. viij.

At half past 7, he set apart of urine oz. vij. (therm. 33°.) All his drink this day was lb. j. oz. ij. beside the cream; his urine, lb. j oz. v. I kept each portion of this day's urine 48 hours also. The appearances at the end of that time were as follows; in the morning urine I found a little cream-coloured sediment, with some lithic acid; in the mid-day urine no cream-coloured sediment, some lithic acid; the evening urine contained little cream-coloured sediment, and a good deal of lithic acid. The whole lithic acid of this day's urine was gr. j½.

Wednesday.

At 10 A. M., thermometer 33°.; at 3 P. M. thermometer 33°.

Thursday.

On getting out of bed, as formerly, he emptied the bladder.

He took for breakfast at half past 9 o'clock,
of fish, oz. v½.
of water, oz. iv.
At 11, he set apart of urine oz. vij. (ther. 33°.)
At 3, he set apart of urine oz. viij. (ther. 33°.)
He took for dinner,
of beef, lb. ½

He took nothing after dinner, and at 8 in the evening he set apart of urine oz. viij.; this day his drink was but oz. iv.; his urine lb. j. oz. vij.; so great a check had perspiration suffered by that sickly disgust, of which he complained from living so much on animal food. After each portion of this day's urine had stood about 48 hours, I found in all much cream-coloured sediment; but in none of them any lithic acid.

Friday.

Getting up as usual at 8 o'clock, he emptied the bladder. His breath this morning had a very sour smell, which even infected his bed-room. He now expressed so great a disgust for animal food, that I could not prevail on him to continue the use of it alone. He therefore lived to-day in the following manner.

At 9 o'clock in the morning, he took for breakfast,

of mutton, oz. iv½.
of potatoes, oz. vj.
of small beer, oz. viij.

At 11, he made of urine oz. vij. The state of the thermometer to-day was, by mistake, not attended to; but that of the weather was not sensibly different from what it had been the day before.

At 3, he set apart of urine oz. vj. and took for dinner,

of mutton, oz. vj.
of potatoes,
of small beer, *sing*. oz. viij.

He eat nothing more this night, till the experiment was ended.

At 7, he set apart of urine oz. vij.; his drink to-day amounted to lb. j. his urine to lb. j. oz. iv.; the sourness of his breath went off towards evening. This day's urine was poured off, each portion about 48 hours after it had been made. The appearances were these: In the morning urine I found some lithic acid, no cream-coloured sediment; in the second portion of Friday's urine, I found some cream-coloured sediment, and some lithic acid; in the last portion there was no lithic acid, but a good deal of the cream-coloured sediment. It is remarkable how quickly the urine is affected by acidity in the alimentary canal. The urine, which was made in the morning when the breath was very sour, deposited chrystals of lithic acid, without any cream-coloured sediment; the mid-day urine, made when the sourness was nearly gone off, deposited both lithic acid, and cream-coloured sediment; while the evening urine, made after every symptom of sourness had been gone for some time, deposited the cream-coloured sediment, but no lithic acid. The sandy deposition of the two first portions of this day's urine amounted to gr. j½. On each day of the above experiment, the exercise was equal, and taken at the same time of the day.

Saturday.

Thermometer at 11, A. M., 33°; at 3, P. M. 33°; at night, 35°.

Sunday.

In the morning, thermometer 36°; in the evening, 37°.

EXPERIMENT III.

WAS made on the same boy.

Thursday.

He emptied the bladder on getting out of bed at 8 o'clock.

At 9, he took for breakfast,
of beef, oz. ij. dr. ij.
of bread, oz. j.

At 11, he set apart of urine oz. iv. (thermometer 38°.)

At 3, he set apart of urine oz. vj. (therm. 38°.)

At half past 3, he took for dinner,
of mutton, oz. vij.
of potatoes, oz. vj.
of small beer, oz. iv.

At half past 8 he made of urine oz. ij. and took nothing to-day after dinner-time; at night he complained of sickness, from having lived so much on animal food. After each portion of this day's urine had stood about 48 hours, in all of them there was cream-coloured sediment, but no crystals of lithic acid.

Friday.

The bladder was emptied as usual at 8 o'clock; his breath to-day had a sour smell, which infected the air of his bed-room.

At 9, he took for breakfast,
of mutton,
of bread,
of water, *sing.* oz. iv.

At 11, he set apart of urine oz. iv. (thermometer 37°.)

At 3, he set apart of urine oz. v. (thermometer 37°.)

At half past 3, he took for dinner,
of mutton, oz. iv.
of potatoes, oz. vj.
of water, oz. iv,

At half past 7, he set apart of urine oz. vj.; the sourness of his breath went off towards the evening. After each portion of this day's urine had stood about 48 hours, I found in that made in the morning about gr. ¼ of lithic acid, but no cream-coloured sediment; in that at 3 o'clock, P. M. gr. j. of lithic acid, no cream-coloured sediment; in the last, no lithic acid, but some cream-coloured sediment. The exercise taken on each day of this experiment was equal.

I found constantly in this boy, that after he had lived a day chiefly or entirely on animal food, although there were no symptoms of acidity that night; yet by next day these were always very evident; this acidity producing the same effects on the urine, as acid *ingesta* do; The effect went off toward the evening, the acidity of the breath also going off. It appears, therefore, that the acidity was some way or other produced in the night time, when the boy used a diet chiefly composed of animal food. The check given perspiration by the sickly state which was induced by the use of such food, in a person accustomed to a very different manner of life, seems to have had a great share in producing these effects on the urine, as will afterwards appear.

EXPERIMENT IV.

WAS made on the same boy mentioned in the last.

First Day.

He got out of bed at 8 o'clock in the morning, and emptied the bladder.

At 9, he took for breakfast,

of boiled beef, oz. iij½.

of water, oz. iv. (therm. 44°.)

At 11, he set apart of urine oz. viij.

At 3, he set apart of urine oz. viij.

At half past 3, he took for dinner,

of boiled beef, oz. v.

of water, oz. iv.

At half past 8 in the evening, he set apart of urine oz. viij. (therm. 46°.) He eat nothing after dinner, complaining of sickness and a great distaste for animal food. His drink this day was only oz. viij., while his urine was lb. j. oz. viij.; so much in this case also did his manner of living check perspiration. I examined each portion of this day's urine about 48 hours after it was made. In all there was cream-coloured sediment, but no crystals of lithic acid.

Second Day.

As usual, he got out of bed at 8, and emptied the bladder; he still complained of a great distaste for animal food, and some degree of nausea; his breath was sour. I prevailed on him, however, to live for this day as he had done yesterday; he therefore took for breakfast,

of cold boiled beef, oz. iij½.
of water, oz. iv.

At 11, he set apart of urine oz. vj. (ther. 46°.)
At 3, he set apart of urine oz. vj. (thermometer 46°.)

At half past 3, he took for dinner,
of cold boiled beef, oz. ij.
of water, oz. iv.

He took nothing after dinner, till past 8 in the evening, at which time he again set apart of urine oz. vj. (therm. 46°.) All his drink this day amounted to oz. viij.; his urine to lb. j. oz. ij. I poured off the three portions of this day's urine, each 48 hours after it had been made; in the morning urine I found some crystals of lithic acid; in the second portion I also found crystals of lithic acid; and in the third a very few; in none was there any cream-coloured sediment. The result of this part of the experiment is very striking. On the first day, when there was no acidity present, all the three portions of urine deposited the cream-coloured sediment, but not the least particle of lithic acid: on the second day, when there was much acidity present, the urine exhibited just the contrary appearances; every portion of it containing crystals of lithic acid, but no cream-coloured sediment. The crystals of lithic acid found in the three portions of this day's urine amounted to gr. j.

Third Day.

The thermometer stood this day at 47°.

Fourth Day.

Having got out of bed, and emptied the bladder at 8 in the morning;
At half past 8, he took
of lemon juice, oz. j.
of sugar, oz. ½.
At 9, he took for breakfast,
of milk, oz. iij.
of bread, oz. viij.
At half past 11, he set apart of urine oz. iij. (therm, 46°.), and took
of lemon-juice,
of sugar, *sing*. oz. j.
At 3, he set apart of urine oz. iij. (ther. 46°)
As his urine had been so scanty, I made him drink between 11 and 3 o'clock,
of water, oz. viij.

At half past 3, he took for dinner,
of apple-dumpling, oz. xij.
of sugar, dr. vj.
Immediately after dinner he took,
of lemon-juice,
of sugar, *sing*. oz. j.
At half past 6, he took,
of bread, oz. vj½.
of milk, oz. viij.
At half past 8, he set apart of urine oz. iij. (thermometer 44°).

All the urine of this day amounted to oz. ix.; his drink, including lemon-juice, to lb. j. oz. xiv; so much had the lemon-juice and vegetable diet increased the excretion by the skin, for he had no stool this day. When we compare the proportion the drink bears to the urine on this day, to what it bore to that excretion on the two former days, we perceive a very striking difference. I poured off each portion of this day's urine, 48 hours after it was made, and found in each a little lithic acid mixed with much cream-coloured sediment.

Fifth

Fifth Day.

He lived exactly as yesterday, each meal consisting of exactly the same food ; he also took the lemon-juice and sugar, as yesterday, and in the same quantity; at 11 o'clock A. M. he set apart of urine oz. iij.; at 3 P. M. of urine oz. iv.; and at half past 8, of urine oz. v. His body was still rather costive; (therm. in the morning 44°., in the evening 45°.) his urine this day amounted to oz. xij.; his drink, which was always water, (except where the contrary is mentioned) being lb. j. oz. iij.; his exercise was equal on each day of this experiment. I poured off each portion of this day's urine, 48 hours after it was made, and found in all of them much cream-coloured sediment, but no crystals of lithic acid.

Sixth Day.

Thermometer during this day 45°.

On comparing the result of this experiment with that of several others, it may appear at first sight singular; but if we consider that the lemon-juice and vegetable diet acted here as powerful diaphoretics, and consequently that the acid passed by the skin, (for it will afterwards be shown that this organ secretes an acid from the blood, even by insensible perspiration) we shall not find it contradict the result of any of the other experiments. I also found that a quantity of apples produced the same effects on this boy, whose perspiration was naturally very vigorous. And on making him eat a considerable quantity of honey, (two ounces twice a day) and at the same time live on vegetable food, he complained of acid eructations; and it was evident that this acid also acted in the same manner as the fruit had done; his urine being very scanty, when compared to the quantity of drink he took; containing much cream-coloured sediment, and few or no crystals of lithic acid.

This experiment clearly shows how little acescent *ingesta* dispose the urine to deposite lithic acid, where the action of the skin is vigorous. And from this, as well as the two preceding experiments, and one still more decisive, afterwards to be mentioned, we learn, that no abstinence from such food takes off the disposition to that disease, when the action of the skin is much diminished.

EXPERIMENT V.

WAS also made on the same boy.

Monday.

He rose as usual, and emptied the bladder at 8 in the morning.
At 9, he took for breakfast,
of beef,
of potatoes,
of small beer, *sing.* oz. iv.
At 11, he set apart of urine, oz. iij. (ther. 39°.)
At 3, he took for dinner,
of salt fish,
of potatoes,
of small beer, *sing.* oz. iv.

At 6, he set apart of urine oz. ix. (ther. 38°.) having made none since 11. About 48 hours after they were made, I examined each portion of this day's urine, and found in both some cream-coloured sediment, but in neither any crystals of lithic acid.

Tuesday.

He lived this day in his ordinary manner, (*h. e.* eating animal food once a day) that the effects of his diet on the former might go off.

Thermometer this day 35°.

Wednesday.

He rose at 8 o'clock, and emptied the bladder.

At 9, he took for breakfast,
of bread,
of milk, *sing.* oz. viij.
At 11, he set apart of urine oz. iv. (ther. 33°.)
He took for dinner,
of apple dumpling, oz. xvj.
of sugar, oz. j.

At 6, he set apart of urine oz. viij. having made none since 11, as on Monday, (therm. 32°); his exercise on each day of this experiment was equal. After each portion of this day's urine had stood about 48 hours, I found in both some cream-coloured sediment, and a deposition of lithic acid, which amounted, on the whole, to nearly gr. j.

Thursday.

Thermometer 32°.

Friday.

Thermometer 29°.

EXPERIMENT VI.

THIS experiment was made on a young man about 20 years of age, and in good health.

He breakfasted, dined, and supped entirely on vegetable substances and milk; at breakfast-time he eat a lemon, at dinner-time another, and a third in the evening. At 6 o'clock in the evening, he set apart a certain portion of urine, and at 10, another; after each had stood 24 hours, there was deposited from them of lithic acid gr. ij

Next day he eat no lemons, and dined chiefly on animal food; at the same times of the day he set apart the same quantities of urine. After each of these had stood 24 hours, neither had deposited any lithic acid.

His exercise was about equal on each day of this experiment.

EXPERIMENT VII.

WAS made on the same person.

First Day.

He breakfasted on beef and bread. For dinner he eat of pork, beef, and bread. For supper, beef and bread. He set apart no urine this day.

Second

Second Day.

He did not complain of his manner of living, nor were there any signs of acidity, as in the boy, from a similar diet.

He took for breakfast, beef and bread; for dinner, of rabbit, beef, and bread.

Morning, mid-day, and evening he set apart of urine oz. iv. (thermometer this day 39°.) After each had stood about 48 hours there was in all some cream-coloured sediment, in none of them any crystals of lithic acid.

Third Day.

Thermometer 39°.

Fourth Day.

Thermometer 35°.

Fifth Day.

Having eat a lemon last night, he lived

this day entirely on vegetable substances; except that at dinner-time he took some broth, in which flesh had been boiled: he also eat two lemons. He set apart no urine this day.

Sixth Day.

This day he lived as yesterday, eating 3 lemons, one in the morning, a second at mid-day, and a third in the evening; at which times also he set apart portions of urine, each as formerly, oz. iv. (thermometer this day 39°.) Having examined these portions of urine about 48 hours after they were made, I found in all of them crystals of lithic acid; which, put together, amounted to about gr. j½. In none of them was there any cream-coloured sediment.

Seventh Day.

Thermometer 39°.

Eighth Day.

Thermometer 39°.

His exercise was equal on each day of the experiment.

EXPERIMENT VIII.

WAS made on myself, when in good health.

First Day.

Having made water at 8 o'clock on getting up, which I did not keep,

At 9 o'clock, A. M., I took for breakfast,

of beef,

of water, *sing.* lb. ½.

At 12, set apart of urine oz. vj. (thermometer 37°.)

Took about this time, of water oz. iv.

At 3, took for dinner,

of fish, oz. vij.

of beef, oz. ij.

of water, oz. vj.

At 5, set apart of urine oz. iij. (therm. 37°.)

This day the drink and urine were nearly equal; the depositions of this day's urine are mentioned with those of the next.

Second Day.

Having got up about 8 in the morning, and emptied the bladder.

At 9, I took for breakfast,

of milk and water, oz. x.

of bread, lb. j.

At 11, I eat a lemon; and at 12 another.

At 1, I set apart of urine oz. vj. (thermometer 35°.)

Took for dinner,

of milk,

of bread, *sing.* lb. j.

At 5, set apart of urine oz. iij.

The urine of this day was nearly equal to the quantity of liquid taken. The exercise on both days was equal.

Two days afterwards, I examined all these portions of urine at the same time; in those of the first day, although they had stood three days, I found only five crystals of lithic acid; in the second day's urine which had stood two days, I found about 120 such crystals; in neither day's urine was there any cream-coloured sediment.

The experiments which have now been related, are sufficient to show, that considerable changes in the manner of living produce very evident changes in the state of the urine; but these appear from more trifling changes of diet; having repeatedly observed, that a single meal or two, more or less acescent than usual, provided it be so to a considerable degree, affects very sensibly the state of the urine.

It is sufficient to relate the following instances, which I have seen confirmed by a great number of others.

EXPERIMENT IX.

WAS made on a young man aged 19 years, and in good health; living partly on vegetable, and partly on animal food; he set apart about 2 o'clock in the afternoon a portion of urine; next day he breakfasted as on the foregoing, and took about the same degree of exercise; after breakfast he eat about lb. j½. of apples; and at 2, as on the preceding day, set apart the same quantity of urine. After each had stood about 72 hours, I found in the latter of lithic acid gr. ij., in the former of the same, gr. j.

EXPERIMENT X.

WAS made on myself, when in good health.

I supped chiefly on bread and milk. Next morning I breakfasted on the same; and after breakfast eat some acescent fruit. About 2 o'clock in the afternoon, I set apart a portion of urine, which, after standing 24 hours, had deposited of lithic acid gr. j.

Next night I supped entirely on beef and bread; the following morning I breakfasted on the same; and at 2 o'clock P. M. set apart a portion of urine equal to what I had done the day before. After standing 24 hours, it had deposited no crystals of lithic acid.

The foregoing experiments are sufficient to prove that acidity of the *primæ viæ (cæteris paribus)* increases the tendency of taken much diluent liquor, I still found my urine deposite more lithic acid than when I was using exercise and taking less diluent liquor. That we must attribute the abundance of the lithic acid in this case to the check given perspiration by indolence, will appear evident, from what is related in Experiment xiv.

These observations account for the following remark of Scheele's: (it is made in the last number of his treatise on the calculus vesicæ) "It is remarkable, that the "urine of the sick is more acid, and con"tains more animal earth than that of "healthy persons."

The result of the experiment now related, is confirmed by the following.

EXPERIMENT XIII.

WHEN in good health, I repeated the last experiment, as follows. I remained at home two days without exercise, and found that half a pound of urine made on the second day, and kept 24 hours, deposited other food aggravating the pain of the head. Yet, during this confinement, my urine deposited much more lithic acid than when I had taken my usual exercise and lived on much more acescent diet. Having kept about half a pound of it 24 hours, I found that it had deposited about gr. ij. of lithic acid. This I repeated at least half a dozen of times with a similar result. After I had recovered from my indisposition, and renewed my usual exercise, I found that the above quantity of urine, kept the same time, deposited about gr. ¾ of lithic acid, often less, and hardly ever more. This I also often repeated; nor indeed have ever found my urine deposite so great a quantity of lithic acid as gr. ij. from half a pound in 24 hours, while I was taking exercise, however acescent my diet was. This fact might perhaps be partly attributed to the kidney, during indolence, separating less watery liquor, and hence more lithic acid in a given portion of urine. But that the appearance is not explained by such a supposition, is clear from this, that, with a view of determining the point, having most readily affected by indolence: but there are also other causes acting here, which tend to produce the above mentioned change on the urine, and which will appear, I think, fully explained in the sequel. I shall only at present remark, that this effect of indolence cannot be accounted for by supposing that the weakness of the stomach produces much acid in the *primæ viæ*, (which has already been shown to increase the deposition of lithic acid from the urine), and hence a greater than ordinary quantity of lithic acid in the urine; for in Eperiment xii. we have seen the same effect take place where little aliment was used, and that entirely animal.

EXPERIMENT XIV.

In this, and the three following experiments, it is shown, that sudorifics or medicines promoting sensible perspiration, diminish the deposition of lithic acid from the urine.

In the illness I have already mentioned, (Experiment xii.) I repeatedly found that half a pound of urine, when kept 24 hours, deposited about gr. ij$\frac{1}{4}$. of lithic acid, although, as was formerly observed, my diet was not in any degree acescent. With a view of removing my complaint, I took scr. j. of Dover's powder. After I had submitted myself to the brisk operation of this sudorific for 12 hours, while the sweat still flowed copiously, I set apart lb. j. of urine, all I had made this day, which, after standing 24 hours, had deposited no lithic acid at all. I again examined my urine after the effects of the sudorific were over, and found that it now deposited as much lithic acid as before I had taken the Dover's powder. The above change, therefore, on the urine, I could only attribute to the increased action of the skin. I had drunk, indeed, that day more than usual, but my urine was not more diluted; its quantity was not greater than usual, the superfluous moisture running off by the skin.

and found in it at the end of that time, a copious sediment of lithic acid, weighing above gr. iij. He had taken about the same quantity of liquid this day, as on the former, his urine being much more copious.

EXPERIMENT XVI.

ABOUT 8 months after I recovered from the above mentioned illness, I submitted myself to the following experiment, when in good health.

In the evening I took gr. ij. of Dover's powder. Next morning I took gr. vj. more; about half an hour after this, the sweat broke out, and continued till 7 o'clock in the evening. Between 3 and 4 in the afternoon, during the sweat, I set apart a portion of urine, and between 6 and 7, another, while the diaphoresis still continued. From morning till this time, I had drunk lb. ij. of milk and water; my urine being only lb. j. Each of these quantities of urine I examined, after it had stood 24 hours, and found that the lithic acid which they contained amounted only to gr. ¼.

Next day, I treated myself in the same way; except that I underwent no diaphoresis. I took no exercise, and drank about lb. ij. of milk and water: my urine this day did not exceed lb. j. during the time of the experiment, viz. from 3 in the morning till 7 in the evening. The small quantity of urine was probably owing to the great abstraction of moisture, which had taken place the day before; it was fully equal, however, to what I had made that day; my food also this day was similar to what it had been on the former. At the same times of the day, I set apart similar portions of urine; on examining them, each 24 hours after it had been made, I found in them a deposition of lithic acid, weighing gr. iij. or twelve times the other deposition. Notwithstanding the greater deposition from the urine of the last day, that of the first was darker coloured.

EXPERIMENT XVII.

WAS made on the man mentioned in Experiment xv.; after he had recovered from his late complaints, and engaged in his usual occupation as a day-labourer; only troubled with two or three biles, a topical affection, and consequently of no importance in influencing our conclusions from the following experiment.

On Sunday morning, he took scr. j. of Dover's powder. After he had sweated 5 hours, he set apart a certain portion of urine. From morning till this time, he had drank rather more than usual; but his urine was hardly equal to what he generally made.

On Tuesday, when engaged in his usual business, (that of a day labourer) he set apart, at the same time of the day, another portion of urine. Both of these I examined on Wednesday morning. Now the whole urine made on Sunday was hardly equal to that made on Tuesday; but the quantity set apart on Sunday was greater than that set apart on Tuesday. He had taken no exercise on the former day, on the latter he had taken a great deal. The urine set apart on Tuesday had not stood 24 hours; that set apart on Sunday, nearly three days. Yet in this I found only 21 particles of lithic acid, a quantity hardly sufficient to turn a nice balance; while, in the Tuesday's urine, there was a deposition of lithic acid, weighing gr. j ½., a dozen or more times the other deposition.

The foregoing cases show, in the most unequivocal manner, that, by exciting sweat, we diminish the quantity of lithic acid found in the urine. Although these are the only cases of this kind of which I have notes, yet I have seen the same effect produced by sudorifics at other times, having never examined the urine, during their operation, without observing it.

The following experiments were made with *diaphoretics*, or medicines increasing insensible perspiration only.

EXPERIMENT XVIII.

THE person mentioned in Experiment ix. underwent the following, when in good health.

He took in small doses, from 12 o'clock at noon till 6 in the evening, gr. j ½. of tartar emetic. At 10, in the same evening, he set apart a portion of urine. This stood 24 hours without depositing any lithic acid.

Next night, at the same time, he set apart an equal portion of urine; after it had stood only 12 hours, I found in it a sediment of lithic acid.

He used similar diet and exercise on each day of the experiment.

EXPERIMENT XIX.

WAS made on the boy, whom I have frequently mentioned, still in good health.

Having examined his urine in its ordinary state, I found too little lithic acid deposited from it to enable me to draw any certain conclusions, even from its total abstraction; I therefore made the experiment on him in the following manner.

When living in his usual way, except that he took rather less exercise, I made him eat four apples after breakfast; and about

2 o'clock P. M. set apart a portion of urine; after this had stood 24 hours, it had deposited gr. j. of lithic acid.

Next day, he lived exactly as on this, except that he took from morning till noon, in small doses, gr. j. of tartar emetic; which produced no sensible effect. About 2 P. M. he again set apart a portion of urine, equal to what he had set apart the day before; after this had stood 24 hours, I found it had deposited no lithic acid at all.

EXPERIMENT XX.

WAS made on myself, while in good health.

Living as usual, but using rather less exercise, I set apart, about 1 o'clock P. M. a portion of urine, which, after standing 24 hours, had deposited a little more than gr. ij. of lithic acid.

Next day I took, in small doses, from morning till mid-day, gr. j. of tartar emetic; this occasioned such a degree of nausea, that I felt a cold sweat on the forehead; the but there was no sensible perspiration on any other part of the body. On this day I used no exercise, that the result of the experiment might be the more striking; living in every other respect as on the former day, the liquid I took being equal, but my urine less. On this day also, I set apart a portion of urine at 1 o'clock P. M. equal to that of the day before. After this had stood 24 hours, I found that it had deposited only two or three particles of lithic acid, a quantity hardly visible had it not been collected in one part of the vessel, and not to be measured by the nicest balance.

EXPERIMENT XXI.

WHILE living as usual, but taking rather less exercise, I set apart about mid-day a portion of urine, which, after standing 24 hours, had deposited gr. ij. of lithic acid.

Next day I took a smaller quantity of tartar emetic than I had done in the last experiment, not much above half a grain, which hardly produced any nausea, and lived in every other respect as on the first day of this experiment About mid-day, I set apart a portion of urine equal to that of the day before; which, after standing 24 hours, had deposited no lithic acid.

It is remarkable that a small dose of tartar emetic more certainly prevents the deposition of lithic acid, than a large one of Dover's powder, although producing a copious sweat; which may be accounted for in the following manner. It will appear from what will be said hereafter, that the secretion of the matter occasioning the deposition of lithic acid from the urine, depends not upon the mere relaxation of the kidney, but upon its vigorous action. I should imagine then, that the same thing takes place in the skin, and that this matter is only separated by it, in proportion to its activity. (For it will afterwards appear, that the matter occasioning the deposition of lithic acid from the urine, passes also by the skin; and indeed, from the experiments already related, we can hardly suppose otherwise.) Now Dover's powder, although it may in some degree increase the action of the skin, yet we must suppose that its sudorific effect is in a great measure to be attributed to the relaxation induced on that organ; whereas antimony acts only by increasing the activity of the skin. There is also another difference in the manner in which these medicines affect the urine. While the Dover's powder produced in general no effect on the urine after the sweat had ceased to flow, the antimony continued, for several days after it was taken, in a greater or less degree, to affect that excretion. I have also repeatedly observed, that the deposition of lithic acid from the urine was not so effectually prevented by this medicine when it produced nausea, as when it produced no sensible effect on the body; which is to be explained on the same principles; for although nausea produces sweat, this is evidently owing to the relaxation it induces on the skin; and from the intimate connexion between the skin and stomach, we cannot suppose the one in a state of vigor, while the other is affected in an opposite way;

for nausea never tends to increase the action of the stomach, but evidently to diminish it; and indeed it affects in the same manner every function of the body.

Of all the medicines we are acquainted with, there is none which more uniformly and effectually supports the excretions than mercury. By proper treatment we can generally direct its operation to the skin; it then proves a safe and powerful diaphoretic. I had an opportunity of trying its effects on the urine in the following manner.

EXPERIMENT XXII.

A YOUNG gentleman of my acquaintance contracted a slight *syphilitic* affection, for which he was obliged to have recourse to mercury. He was a very proper subject for my observations, as I had had occasion frequently to examine his urine in various circumstances; so that I knew perfectly what changes to expect from different modes of life. I found the state of his urine at all times much affected by indolence; a pound, when he remained at home, depositing near gr. iv. of lithic acid in 24 hours, although his diet was not more acescent than usual.

When rubbing in dr. j. of strong mercurial ointment each day, staying at home without exercise, and living on vegetables alone, he set apart oz. iv. of urine; this I kept 48 hours, and found in it no lithic acid, but a considerable quantity of cream-coloured sediment. At this time his urine was less than usual. From having treated his affection carelessly, he found it necessary to continue the use of mercury for no less than three months, during the whole of which time I examined the state of his urine; and constantly found, that, when it was much lessened in quantity, that is, when the mercury acted as a diaphoretic, it deposited no lithic acid, but much cream-coloured sediment. For the first week or two, his urine was not above the half of its usual quantity; as his stomach, mouth, and general health, however, became affected by the mercury, the urine became more copious, and deposited more lithic acid: hence it is evident, that the mercury acted at first as a diaphoretic, this effect ceasing as the debility of the system increased; and particularly that of the stomach, the vigorous action of which is ever necessary for that of the skin.

These appearances I saw take place a second time. He was persuaded to give up the mercury for some time, and try the effects of a pretty full diet. He became better in his general health; (for the affection under which he laboured was too trifling to affect this) and, on returning to the use of mercury, the same scanty urine took place, together with the same deficiency of the lithic acid, and increase of the cream-coloured sediment. These effects, however, were neither so great nor permanent at this time as formerly; his stomach too and general health became sooner affected.

After he had remained at home for about three weeks, the mercury seemed to act as a diuretic. The urine was then of a lighter colour, in greater than usual quantity, and deposited less lithic acid; undoubtedly owing to the greater proportion of watery liquor present.

Before I leave this case, it is necessary to remark, that when the urine was so scanty, the body was rather costive than otherwise. I also found in the person now mentioned, that applying mercury in the form of ointment to the skin, tended more to promote perspiration, than taking it by the mouth; although the latter did not produce the least cathartic effect; a circumstance probably owing to the mercury taken in this way producing a greater degree of dyspepsia; which, in this patient, it always did.

The effects of mercury on the urine, when acting as a diaphoretic, are further seen in the following experiment.

EXPERIMENT XXIII.

WAS made on the boy whom I have frequently had occasion to mention, still in good health.

First Day.

He rose at 8 o'clock in the morning, and emptied the bladder.

At 9, he took for breakfast,
of bread,
of milk, *sing.* oz. viij.
of honey, oz. j.

At 11 in the forenoon, he set apart of urine oz. vj. (thermometer 39°.)

At 3, he set apart of urine oz. vij. (thermometer 39°.)

At this time, he eat of honey, oz. j.

At half past 3, he took for dinner,
of sour cream, lb. j.
of bread, oz. xj.
of sugar, dr. vj.

At 6, he made of urine oz. iij.; this I did not keep.

At 7, he took,
of bread, oz. vj.
of milk, oz. viij.

He set apart at half past 8, of urine oz. iij.

All his urine this day was oz. xix. his drink lb. j., and lb. j. of sour cream which was semifluid. I poured off each portion of this day's urine, after it had stood 48 hours, and found in all some cream-coloured sediment, and some lithic acid; the latter amounted to gr. $\frac{3}{4}$.

Second Day.

He emptied the bladder, on getting out of bed, at 8, as yesterday.

At 9, he took for breakfast,
of bread, oz. x$\frac{1}{2}$.
of milk, oz. viij.
of honey, oz. j.

At 11, he set apart of urine oz. vj. (thermometer 32°.)

At 3, he set apart of urine oz. vj. (thermometer 33°.)

At this time, he took of honey oz. j.

At half past 3, he took for dinner,
of sour cream, oz. xij.
of bread, oz. x.
of sugar, oz. j.

At 6, he took,
of bread, oz. vij.
of milk, oz. viij.

At half past 7, he set apart of urine oz. vij. (thermometer 33°.)
He took nothing more to-day. His urine this day was oz. xix.; his drink lb. j. besides the cream. After each portion of this day's urine had stood 48 hours, I found in all of them a little cream-coloured sediment, with a considerable quantity of lithic acid, amounting to gr. j$\frac{1}{2}$.

Third Day.

Thermometer this day 33°.

Fourth Day.

On the evening of this day, he took a mercurial pill; which he continued to do morning and evening, for four days.

Fifth Day.

This was the morning of the fifth day since he began to take the mercury, which he continued to do to the end of the experiment.

He rose out of bed, as usual, and emptied the bladder at 8 o'clock in the morning.

At 9, he took for breakfast,

of bread,

of milk, *sing*. oz. viij.

of honey, oz. j.

At 11, he set apart of urine oz. v. (thermometer 38°.)

At 3, he set apart of urine oz. v. (thermometer 38°.)

His mouth to-day was not affected.

At 3, he eat of honey oz. j.

At half past 3, he took for dinner,

of apple dumpling, lb. j. oz. v.

of sugar, oz. j.

At half past 5, he made of urine oz. iij.; which was not kept. At this time he had one natural stool.

At 6, he took of bread, oz. iv.

of milk, oz. viij.

At 8, he set apart of urine oz. ij.; his whole drink this day amounted to lb. j. not including a considerable quantity of moisture in the dumpling, his urine to oz. xv.; he took nothing more this night but oz. iv. of milk. After each portion of this day's urine had stood 48 hours, I found in all of them cream-coloured sediment; but in none was there any lithic acid.

Sixth Day.

His mouth to-day was a little affected, but there was no sensible salivation.

He rose this morning as usual, and emptied the bladder at 8 o'clock.

At 9, he took for breakfast,

of bread,

of milk, *sing.* oz. viij.

of honey, oz. j.

At 11, he set apart of urine oz. iij.

At 3, he set apart of urine oz. vj. (ther. 36°.)

At this time he took of honey oz. j.

At half past 3, he took for dinner,

of apple-dumpling, lb. j.

of sugar, oz. j.

At 6 in the evening, he took

of bread, oz. vj.

of milk, oz. viij.

of water, oz. iv.

At 8, he set apart of urine oz. iv. (thermometer 35°.) He had one natural stool to-day.

All his drink this day was oz. xx. beside the moisture in the dumpling; his urine only oz. xiij. I examined each portion of this day's urine 48 hours after it had been made; in the morning urine there was some lithic acid, and a small quantity of cream-coloured sediment: the lithic acid in this amounted to gr. ½. In the other two portions there was no lithic acid, but some cream-coloured sediment.

Seventh Day.

Thermometer in the morning, 35°; in the evening, 34°.

The experiment now related would have been even more conclusive on a person whose perspiration was not so easily promoted; for in this boy the vegetable diet alone was sufficient to produce this effect in a remarkable degree.

M. Berthollet found that sweat contained an acid; and there are many reasons which would incline us to believe that an acid also passes by insensible perspiration; that this supposition is well founded, appears from the following experiment.

EXPERIMENT XXIV.

I TIED a piece of paper stained with litmus about my ne[illegible] After it had remained there 8 [illegible]uring which time there was no sen[illegible]rspiration on any part of the body, I [illegible]nd it changed to a red colour. This experiment I again repeated, allowing the paper to remain applied only for four hours, and still found it changed to a red colour. In making this experiment a piece of the stained paper torn from what was applied was preserved, that by comparing the two pieces the result might be the more decisive.

Urine left to itself deposites either a whitish matter rendering it turbid, which I have called the cream-coloured sediment, and this often in an hour or two after it is made; or crystals of lithic acid, which generally appear after the urine has remained out of the body for a longer time; or sometimes both. In making the foregoing experiments it was easy to observe what circumstances disposed to the one or other deposition. The following observations the reader will find supported by the experiments where the cream-coloured sediment is noticed. The reason why it is not always noticed is, that when I began these experiments I neglected it as an accidental appearance; and it was not till it had very frequently occurred that I paid particular attention to it, in order to ascertain the circumstances which influenced its appearance.

1. The cream-coloured sediment and the lithic acid were never observed in considerable quantity in the same urine; where there was much of either, there was little or none of the other.

2. While the lithic acid was found in greatest quantity in the urine of a person using ascescent diet, the cream-coloured sediment was increased by food of a contrary tendency.

3. Any cause promoting perspiration,

while it diminished the quantity of lithic acid, tended to produce the cream-coloured sediment.

The following observations on the effects of acids on the urine after it is out of the body will place the result of the preceding experiments in a clearer point of view.

I learned a curious fact from an anonymous pamphlet* after the treatise in which the foregoing experiments were first published was nearly compleated. The author observes, that on adding any acid, even the carbonic, to urine, he always procured a copious deposition of what he calls the concreting acid, which is the same I have mentioned under the name of lithic acid.

This experiment I have repeated frequently, both with recent urine and that which had been kept some time, using the sulphuric, nitrous, muriatic, and acetous acids, the acid of lemons, &c., and in all instances found the result as stated in the above pamphlet.

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* This work is entitled, *A Treatise upon Gravel and upon Gout, in which the Sources of each are investigated, and effectual Means of preventing or removing those Diseases, recommended,* published in 1786.

Another effect of acids on the urine is that of changing its colour, which they redden considerably and render darker,* these effects appearing more suddenly if the temperature be raised.

If urine be exposed for some time to the elastic fluid evolved from a mixture of chalk and sulphuric acid, its colour appears somewhat reddened, and the deposition of the lithic acid is increased. But these effects are less perceptible from the carbonic, than from any other acid, except that lemon juice and vinegar seem to change the colour in a still less degree.

The strong nitrous acid excites an effervescence with urine whether recent or not, during which a permanently elastic fluid is disengaged, which precipitates the calcareous earth of lime water, and undergoes no contraction on the addition of atmospheric air. The vitriolic acid produces the same effect but in a less degree. The diluted nitrous acid occasions very little effervescence. This effect of acids also is increased by raising the temperature.

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* Vinegar and lemon juice produce the precipitation of the lithic acid without changing the colour of the urine. When the colour of the urine is darkened by any acid, that of the crystals of lithic acid produced is also darkened in nearly the same degree.

The muriatic acid excites no effervescence with urine, whether applied in its common or oxigenated state. If urine be exposed to the vapour arising from muriatic acid and calx of manganese, it is totally absorbed, but no elastic fluid is evolved; neither is any evolved on adding to the urine the acetous acid or the acid of lemons, although the temperature be considerably raised. Acids I found, while they occasioned a deposition of lithic acid, prevented the appearance of the cream-coloured sediment; and on adding an acid to urine which contained the cream-coloured sediment, this disappeared while the lithic acid was deposited, leaving the urine, formerly turbid with the cream-coloured sediment, perfectly transparent. Urine containing cream-coloured sediment will not become transparent merely by standing for some time at rest, after keeping it for months without the addition of an acid I have always found it as turbid as at first. The urine which contains most cream-coloured sediment, on the addition of an acid deposites most lithic acid, and requires the longest time to become transparent.

As every acid which is mixed with the urine, produces a precipitation of lithic acid, we must infer, when we see more than usual of this acid in the urine on using acescent diet, that the acid derived from such diet acts in the same way, producing the copious red sediment we observe on such occasions. But however acid the diet may be, if we artificially increase perspiration, or if this be naturally vigorous, the acid will pass by the skin, (for it has been shown, that an acid passes even by insensible perspiration) and hence produce none of its effects on the urine.

It is a question of some importance, whether the body, by its own powers, generates an acid capable of precipitating the lithic acid from the urine? Or is such an acid always derived from acescent diet? Several of the above experiments seem to show, that this acid is constantly generated in the body, independently of all acid derived from the alimentary canal; and that it may pass in great quantity by the kidney, while the person uses aliment which can produce no acidity. We have seen the urine depositing much lithic acid, when there was little food taken; and that which was entirely animal, continued not for a day or two, but several weeks.

Reflecting on what has been said, we shall find that there are three different states in which the urine may exist; indicating different conditions of its secreting organs.

The first is, when the vessels of the kidney are constricted; in this case, the urine flows limpid, and deposites little sediment of any kind; we see it in this state in the cold stage of fevers, from the application of cold to the surface of the body, &c. The second is, when the urine is high coloured, but deposites little lithic acid; the kidney seems now in a state of relaxation,

tion, rather than of vigorous action: this I infer, from having always observed the urine secreted during sleep, however short a time retained in the bladder, fully as high coloured as that secreted during vigilance, when every part of the system is in greater activity; this urine more frequently contains the cream-coloured sediment, than that secreted when the kidney is most active, but less lithic acid. When the vigorous action of the kidney takes place, it forms the third state; here the colour of the urine is not higher than in the case of mere relaxation; it, however, deposites more of the lithic acid, but generally less cream-coloured sediment.

This state of the kidney is induced by any cause obstructing perspiration.

The skin and kidneys separate the same acid from the blood; when the action of the one is diminished, that of the other is increased in order to prevent an accumulation of acid in the system: hence it is, that the proper action of the skin being prevented, more of this acid passes by the kidney, and consequently there is a greater deposition of lithic acid from the urine. Whether this action of the kidneys may be produced by diuretics, and the system freed from any over proportion of the acid, is a question which cannot positively be answered for the reasons given in Experiment xi. But if we consider what has just been said, we must suppose that increasing the action of the kidneys by diuretics, is better calculated to free the system of this matter, than the use of fluids acting merely as diluents, and which seem not to affect the deposition of lithic acid, except that, by increasing the proportion of fluid, they render it rather less apt to be deposited: for Scheele and Bergman have shown that this acid, though in small quantity, is soluble in water.

From what I have observed in myself, as well as from other considerations, I cannot help thinking, that the kidney experiences these three states once a day, in a greater or less degree, according as the constitution is more or less irritable.

At night there is often formed some degree of a febrile state, even in the most healthy; and to this I would attribute my generally observing the urine paler in the evening than at other times of the day, except where a diaphoretic had been used, evidently preventing the febrile state.

The second state of the kidney seems to take place during sleep, especially towards morning. During sleep, there is a relaxation of the febrile state formed in the evening; and hence one reason of the morning urine being higher coloured than that made at other times; this urine likewise most generally deposites the cream-coloured sediment. When I first began these experiments on the urine, I expected to find, according to the general opinion, that the morning urine, as being highest coloured, would also deposite most lithic acid; but repeated experiments convinced me, that this was not the case; so much the contrary sometimes happened, that having kept the morning and mid-day urine of the same day, each 48 hours, I found not above a few particles deposited from the former; while in the latter there was a copious sediment of lithic acid, and this notwithstanding

standing the morning urine was both higher coloured, and in greater quantity.

The mid-day urine forms the third state; this I generally observed of a colour not so dark as the morning urine, nor so light as that of the evening; but depositing a greater quantity of lithic acid than either.

We must suppose the same diurnal revolution to take place in the skin. In the evening during the febrile state, it is constricted; during sleep, relaxed; and in vigorous action during the day-time. There is reason, we have seen, (Experiment xxi.) to suppose that the acid occasioning the precipitation of lithic acid is only thrown off by this organ, as by the kidney, in proportion to its vigorous action; hence there will constantly be an accumulation of acid during the night, to be thrown off the following day by the renewed vigour of the skin and kidneys.

As this acid in many at least, perhaps in most cases, lays the foundation of calculous complaints, the foregoing observations tend to establish a fact of considerable importance with regard to the pathology of such complaints; that it is by the vigorous action of the skin and kidneys that any dangerous accumulation of acid must be guarded against, no abstinence from acescent ingesta being sufficient for this purpose.

Upon the whole, from the foregoing experiments and observations, we may conclude, in the 1st place, That any cause obstructing perspiration produces a greater than ordinary precipitation of lithic acid from the urine. 2ndly, That the same precipitation is, *cæteris paribus,* increased by acescent diet, and much diminished by using a large proportion of animal food. 3dly, That by the inactivity of the skin and kidneys, an accumulation of acid may take place in the system, only to be thrown off by restoring their action. 4thly, That by the use of diaphoretics, we can often entirely prevent the deposition of lithic acid from the urine, causing in its stead that of the cream-coloured sediment.

Such is the foundation of the observations made in the 365th, 366th, and 367th, pages of the first volume.

OF FEBRILE ANOREXIA.

I WAS seized, after a long confinement, with great anxiety, weakness, and complete anorexia, which lasted near four days, accompanied with considerable thirst, and failure of saliva. During the second night, having sucked an orange, in order to remove the disagreeable dryness occasioned by the want of the saliva, next day I felt nausea, and oppression referred to the stomach; which induced me to evacuate it, by irritating the fauces, about eight hours after I had taken the orange juice; I was much surprised to find it, after that stay in the stomach, unaltered and unmixed with any other substance.

It would appear from this case that anorexia is connected with a deficiency of gastric liquor. It was evident, that there was nothing in the stomach but the orange juice which had undergone no change, doubtless because there was no gastric liquor present.

We must infer from the experiments of Spalanzani and others, that the gastric liquor is the means of effecting that change which the food undergoes in the stomach; and does it not seem probable that the sensation of hunger may arise from the action of this fluid on the stomach, and that its absence is indicated by anorexia, a provision of nature which prevents us from eating at a time when no digestion could go on; by which we should only produce repeated vomiting, without receiving nourishment?

From these observations it would appear, at first sight, that, by emptying the stomach of its gastric liquor, we might, at will, produce anorexia; from what has been said, as well as what I am about to mention, I believe we might; but it is very difficult to empty the stomach entirely of its gastric liquor; both because it is difficult to empty it entirely of any of its contents, and because the very act of vomiting, by the strong stimulus applied to the stomach, excites it to pour out a fresh quantity; but that anorexia can be nearly produced, and the sensation of hunger almost entirely taken away, by freeing the stomach of the gastric juice, appears from the following experiment.

Having ate nothing after dinner, nor drank any thing but water; next morning I still increased my appetite by walking. On returning home, I was very hungry, having ate nothing for above 17 hours; instead of taking breakfast, by means of luke-warm water I repeatedly excited vomiting.

The water came up clear, and only mixed with a ropy transparent fluid, such as the gastric liquor is described by Spallanzani, or as I have myself procured from the stomach of a crow.

This plainly indicated, that there had been nothing in my stomach but the gastric liquor which was mixed with the water, and in that state, without sensible taste, smell, or colour.

After I had undergone this operation, every sensation of hunger was removed, and rather a disgust for food produced, which I sensibly felt on seeing others eat. At breakfast I found myself satisfied, even to sickness, after eating half the usual quantity; this continued for several hours, accompanied with oppression referred to the stomach.

These observations strengthen the opinion, that the presence of the gastric liquor in the stomach, without such substances as are fit for combining with it, and thus destroying its activity, is a principal cause of that death which is occasioned by hunger; for anorexia, we have seen, is produced by the evacuation of the gastric liquor; and every one knows, how long a person, labouring under anorexia, will live without aliment.

The speedy acidity which took place in this experiment, is remarkable. Although the stomach was perfectly free from every fermenting substance before breakfast, as was evident from the state of what was thrown up; yet, the food (bread and milk) acquired acidity in a quarter of an hour, indicated by acid eructations.

Does it not appear from this case that a diminution of the due quantity of gastric juice is at least one cause of dyspepsia? Is it not probable that in such, perhaps in all, cases of dyspepsia, the symptoms may be relieved by supplying the patient with the gastric liquor of those animals, whose food is most similar to that of man ; This I was led to propose from the cases just related in a treatise above alluded to, published nine years ago.* In a thesis published at Edinburgh several years after, by Dr. Scot, it is observed that an Italian physician finding every thing else fail in a dyspeptic case, had recourse to the gastric liquor of brutes, which proved successful.

To return from this digression. We have reason to believe then, that anorexia is the consequence of the secretion of gastric juice being interrupted; that it should be a symptom of fever therefore where the parched skin, dry mouth, costive bowels, and scanty urine, indicate a general want of secretion, is what we should, a priori, have expected.

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* An Inquiry into the remote Cause of Urinary Gravel.

END OF THE THIRD VOLUME.